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MOSQUITO ATLAS

PART I

The Nearctic Anopheles

Important Malaria Vectors of the Americas and

Aedes aegypti, *Culex quinquefasciatus*



Published By

The American Entomological Society

The Academy of Natural Sciences

Philadelphia

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Important Malaria Vectors of the Americas and
Aedes aegypti, *Culex quinquefasciatus*

BY

Edward S. Ross

and

H. Radclyffe Roberts

First Lieutenants, Sanitary Corps,
Army of the United States



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Issued May 28, 1943

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CONTENTS

Acknowledgments.....	iv
Anatomy of Anopheles adults.....	1
Anatomy of Anopheles larvae.....	3
Preparing adult mosquitoes for study.....	5
Preparing male terminalia for study.....	5
Preparing mosquito larvae for study.....	5
Anopheles (Anopheles) maculipennis freeborni.....	7
Anopheles (Anopheles) maculipennis, American complex.....	9
Anopheles (Anopheles) quadrimaculatus.....	11
Anopheles (Anopheles) punctipennis.....	13
Anopheles (Anopheles) walkeri.....	15
Anopheles (Anopheles) atropos.....	17
Anopheles (Anopheles) crucians crucians.....	19
Anopheles (Anopheles) crucians georgianus.....	21
Anopheles (Anopheles) crucians bradleyi.....	22
Anopheles (Anopheles) pseudopunctipennis.....	23
Anopheles (Anopheles) punctimacula.....	25
Anopheles (Anopheles) barberi.....	27
Anopheles (Nyssorhynchus) darlingi.....	29
Anopheles (Nyssorhynchus) albitarsis.....	31
Anopheles (Nyssorhynchus) aquasalis.....	33
Anopheles (Nyssorhynchus) albimanus.....	35
Anopheles (Kerteszia) bellator.....	37
Anopheles (Myzomyia) gambiae.....	39
Aedes (Stegomyia) aegypti.....	41
Culex (Culex) quinquefasciatus.....	43

FOREWORD

Species of mosquitoes differ greatly in their habits and capacity to transmit disease, so that any effective plan of control should first require their identification. By knowing what species are present in an area, the published observations and previous experience of others for each species can be referred to, and thus much time can be saved and wasted effort avoided in applying control measures. Unfortunately, the task of making accurate identifications of these small and complex insects is not easy, even where they are well known and adequately described. Added to this difficulty is the frequent lack of available literature for their identification. Too often the desired information is found in widely scattered journals, or in relatively unobtainable monographs.

This Mosquito Atlas is primarily designed to fill this need for descriptive information in a simplified and concise form. To best accomplish this objective, the major emphasis has been placed on illustrations. Illustrations can give the greatest amount of information in a minimum of space, and also reduce the difficulties of terminology.

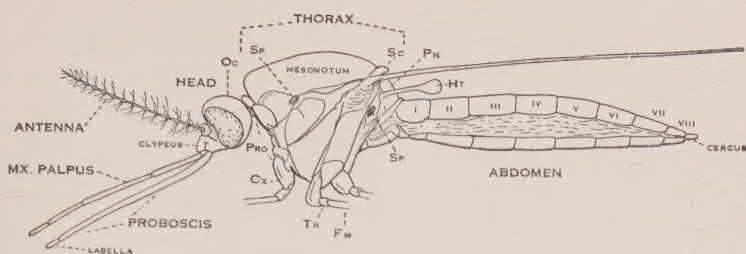
Then also the treatment of each species on a single loose-leaf sheet can permit greater flexibility. That is, the more important species can be treated first; additional species can be added and interpolated later; any desired selection and arrangement of the species can be made according to the wishes of the user; changes and additions can be made indefinitely, so that the Atlas need never become obsolete. It is hoped that other authors will contribute towards its greater completeness.

In employing this Atlas for the determination of species, the illustrations are intended to be used as the equivalent of an identified specimen from a definite locality (this locality is indicated for each species). The accompanying descriptive matter will point out the more critical features to be observed. As a general rule, no single feature will be found diagnostic by itself, and all characters must be considered. Furthermore, allowance must be made for individual variation, since no two individuals are ever identical. Available keys and/or descriptions should also be used with the Atlas, both as a guide and a method of confirmation, especially where all species for a region are not completed.

Part I of the Mosquito Atlas includes all of the Nearctic *Anopheles*; the important malaria vectors of the Americas; and, because the plates were available, two culicine species of medical importance. The African species, *Anopheles gambiae*, is included because of its possible reappearance in the Americas. Subsequent parts, now in preparation, will cover the important malaria vectors of the Old World.

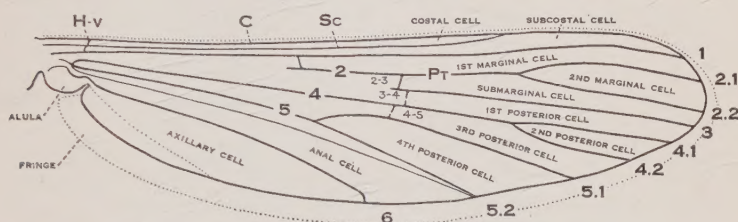
ACKNOWLEDGMENTS

THE writers wish to express their gratitude to Colonel Harvey R. Livesay, M.C., Commanding Officer, Eighth Service Command Laboratory, U. S. Army, for his enthusiastic encouragement and aid in the initial planning and development of the Atlas. They are very much indebted to Brigadier General James Stevens Simmons, M.C., Chief, Division of Preventive Medicine, Office of the Surgeon General, U. S. Army, and especially Lieutenant Colonel Paul F. Russell, M.C., Chief, Malaria Control Section of that office, for making it possible to carry out the project. Dr. Alexander Wetmore, Assistant Secretary, Smithsonian Institution, and other officials kindly provided laboratory facilities for its preparation at the U. S. National Museum. Dr. Alan Stone, Entomologist, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, and Dr. L. E. Rozeboom, Johns Hopkins School of Hygiene and Public Health, generously made available collections in their charge and offered valuable suggestions and assistance.



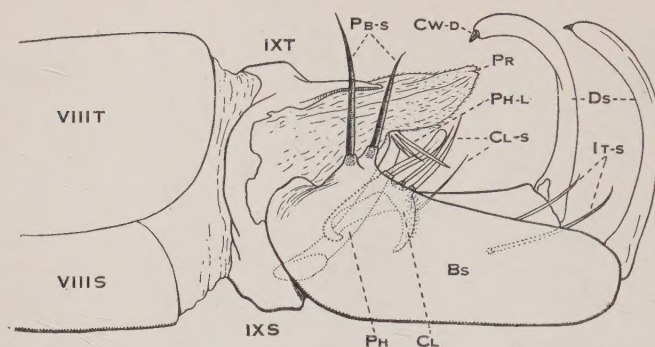
ADULT ANOPHELES FEMALE

Explanation of symbols: (Cx) Coxa, (FM) femur, (Ht) halter or balancer, (Mx) maxillary, (Oc) occiput, (PN) postnotum, (PRO) prothorax, (Sc) scutellum, (Sp) spiracle, (Tr) trochanter. Roman numerals number the abdominal segments.



ANOPHELES WING VENATION

<i>Terminology adopted here</i>		<i>Comstock-Needham system</i>	
C	Costa	C	Costa
Sc	Subcosta	Sc	Subcosta
1	First longitudinal	R ₁	Radius 1
2	Second longitudinal	R ₂₊₃	Radius 2 plus 3
3	Third longitudinal	R ₄₊₅	Radius 4 plus 5
4	Fourth longitudinal	M	Media
5	Fifth longitudinal	Cu	Cubitus
6	Sixth longitudinal	2ndA	Second Anal
H-v	Humeral cross-vein	h	Humeral cross-vein
2-3	Cross-vein between veins 2 and 3		uncertain
3-4	Cross-vein between veins 3 and 4	r-m	Radio-medial cross-vein
4-5	Cross-vein between veins 4 and 5	m-c	Medio-cubital cross-vein
Pt	Petiole of vein 2 (from cross-vein 2-3 to fork)		



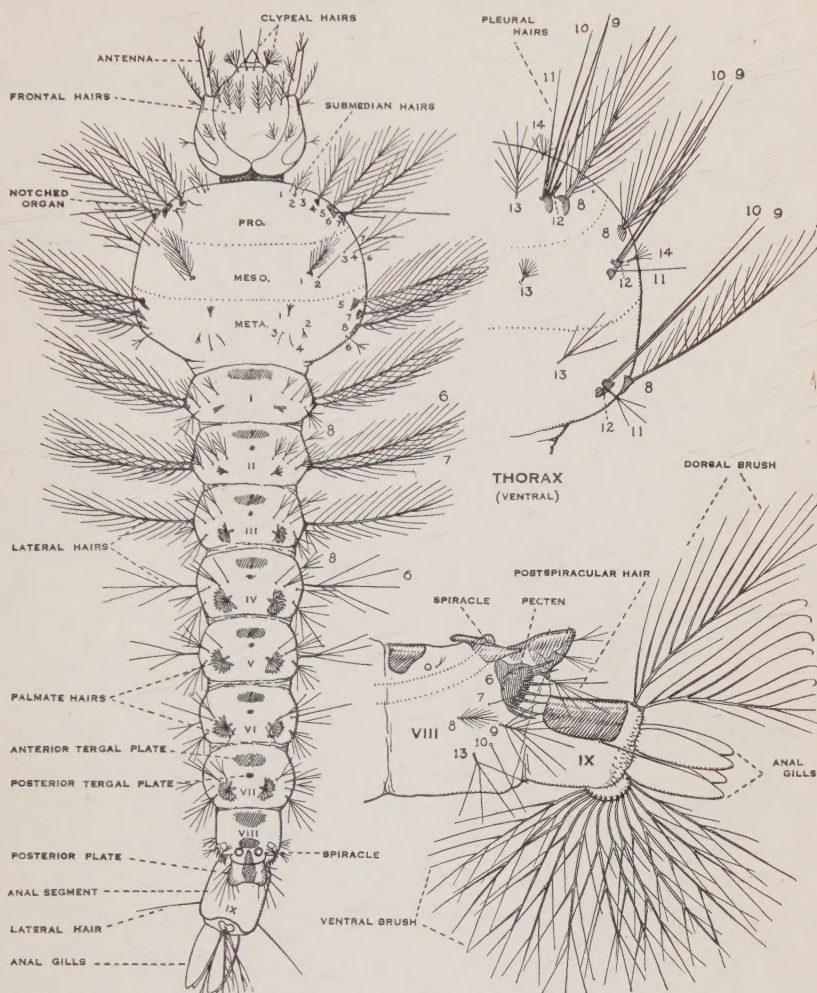
ANOPHELES MALE TERMINALIA

(Lateral aspect. Based on *A. quadrimaculatus*)

AC-S	Accessory spine	PH	Phallosome (mesosome, ædeagus, penis)
Bs	Basistyle (side piece, coxite)	PH-L	Phallosome leaflets
CL	Claspette (harpago)	P-I-X-T	Process of 9th tergite (lobe of 9th tergite)
CL-S	Claspette spines	PR	Proctiger (anal lobe)
CW-D	Claw of dististyle (appendage of dististyle)	V-L	Ventral lobe of claspette
D-L	Dorsal lobe of claspette	IX T	Ninth tergite
Ds	Dististyle (clasper, style)	IX S	Ninth sternite
IT-S	Internal spine		
PB-S	Parabasal spine		

A few hours after the adult male emerges the terminal portion of the abdomen beyond the seventh segment begins to rotate 180° on its axis. This rotation is completed in 12 to 24 hours. The whole end of the abdomen then remains upside down for the remainder of the insect's life, so that the phallosome and other reproductive elements lie above the proctiger or anal lobe. To avoid confusion the above drawing shows the terminal segments in their original position before they have rotated, since the dorso-ventral relationship of parts is referred to in descriptions according to their original position and not according to their later orientation.

For a three-dimensional understanding of the male terminalia, compare the above drawing with that on the sheet of *A. quadrimaculatus* (page 11). In examining a cleared whole mount of the terminalia with the true dorsal side uppermost, it should be possible to readily identify the major features from the drawings. Caution is necessary in interpreting a crushed specimen where the cover-slip has not been properly supported, as the parts may be distorted in shape and their relative position altered. The large, rather transparent proctiger or anal lobe overlays the phallosome and most of the claspettes. To see the details of these latter structures more clearly it is often desirable to dissect them out, as described on page 5. The tube-like body of the phallosome forms the terminal portion of the genital duct. The pair of claspettes lies mostly ventrad to the phallosome and arises from the base of the basistyles. These claspettes may become divided in some species into a dorsal and ventral lobe, in other species the pair of ventral lobes of the claspettes may become fused to form a single element, as in the subgenus *Nyssorhynchus*. In this subgenus the claspettes are best seen and illustrated from the ventral aspect. The preparation and study of the terminalia is not easy for the beginner, but their detailed structures show the most critical differences for the identification and systematic study of the adult.

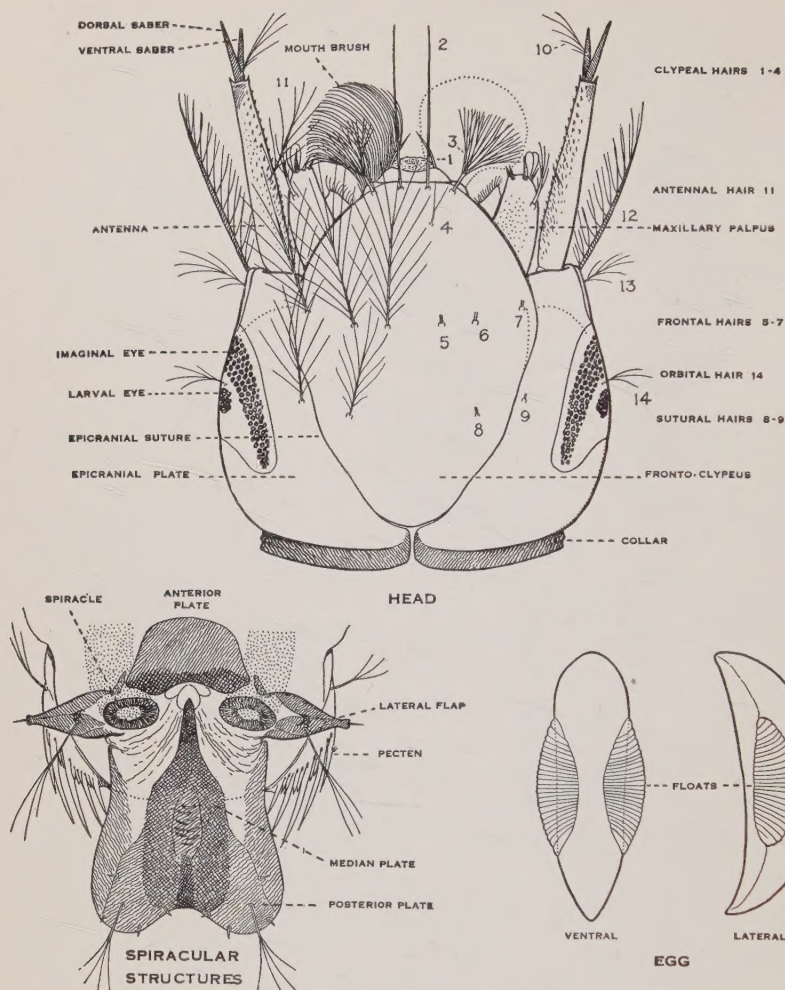


ANOPHELES LARVA (4th instar)

(Based on *A. quadrimaculatus*)

THORAX. Thoracic segments: (PRO) prothorax. (MESO) mesothorax. (META) metathorax. Submedian hairs (shoulder hairs): (1) inner, (2) middle, (3) outer. Lateral hairs: hairs 4 to 8. Pleural hairs: hairs 9 to 12. Ventral hair: hair 13. A pair of membranous lobes, notched organs, are found on the prothorax and probably have a function similar to the palmate hairs.

ABDOMEN. Segments numbered by roman numerals. For numbering of dorsal hairs refer to species plate of *A. quadrimaculatus* (p. 12). Anterior submedian hair, hair 0 (poorly developed in this species). Palmate hair, hair 1. Antepalmate hair, hair 2. Sublateral hairs, hairs 3 to 5. Lateral hairs, hairs 6 to 8.

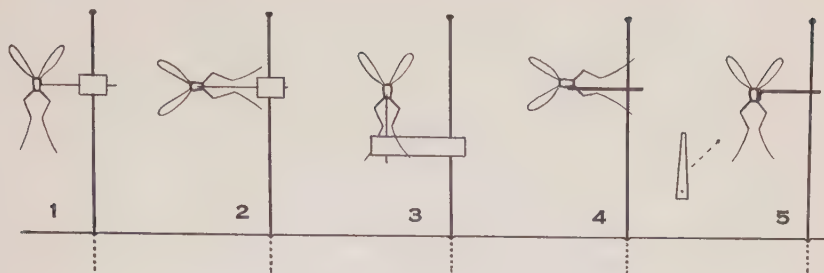


ANOPHELES LARVA (4th instar)

(Based on *A. quadrimaculatus*)

HEAD. Mouth brush (left side) and maxillary palpus are illustrated, though ordinarily omitted. Careful observation is often necessary to distinguish the outer clypeal hairs when the mouth brushes are expanded beneath them. *Clypeal hairs:* (1) inner preclypeal; (2) inner clypeal; (3) outer clypeal; (4) postclypeal. *Frontal hairs:* (5) inner frontal; (6) mid-frontal; (7) outer frontal. *Sutural hairs* (occipitals): (8) sutural (inner); (9) trans-sutural (outer). *Antennal hairs:* (10) terminal; (11) antennal; (12) basal; (13) sub-basal. *Orbital hairs:* (14) supraorbital (orbital); (15) infraorbital (not seen from above). *Antennal sabers:* dorsal saber; ventral saber.

SPIRACULAR STRUCTURES. The above terminology, though generally used by American authors, is not universal. It is here considered to be tentative and in need of further consideration.



PREPARING ADULT MOSQUITOES FOR STUDY

MOUNTING FRESHLY KILLED SPECIMENS. Micro-pins (minuten nadeln) may be used to impale the freshly killed specimens, as shown in drawings 1 to 3, because of the adhesive quality of the body fluid. The micro-pins should be first mounted on the insect pin by a piece of cork or pith as illustrated.

MOUNTING DRY SPECIMENS. Specimens received in pill boxes, or dead for more than 12 hours should be glued to paper points as illustrated above (4 and 5). In all cases mosquitoes must be handled with utmost care to avoid the rubbing off of scales.

STORAGE OF UNMOUNTED SPECIMENS. Place between layers of glazed cotton, cellucotton, or cleaning tissue in pill boxes of appropriate size. Plain cotton is objectionable because of the frequent damage of specimens when later removed. The amount of packing should be no more than necessary to prevent movement. Unmounted specimens should be packed in this manner for shipping.

PREPARING MALE TERMINALIA FOR STUDY

1. Carefully clip off tip of abdomen with fine scissors. Allow tip to drop from specimen into small dish of 70 to 95% alcohol (to wet).

2. Transfer with pipette or bent needle to dish of 10 to 20% KOH for 5 to 20 minutes; longer if to be stained.

3. Transfer to slide in tip of pipette. Remove excess KOH by blotting from edge of drop.

4. Add small drop of glacial acetic acid to neutralize KOH and partly dehydrate. Blot off excess.

5. Add small drop of chloral-gum media, described under larval mounts. Orient specimen. Place small bits of glass or paper around specimen to prevent crushing by cover slip. Drop cover slip in place.

If it is desired to use balsam or clarite mounting media, the specimens should be cleared by adding a drop of clove oil or xylol between steps 4 and 5 and the clarite or balsam substituted for chloral-gum in step 5.

In the genus *Anopheles* the proctiger so obscures the details of the phallosome and claspettes that it is usually desirable to dissect off these latter elements together with the basistyles from the proctiger and ninth segment. This should be done under a dissecting microscope with fine needles just before adding the mounting medium. For a special technique of dissecting and staining *Anopheles* terminalia see Komp, Public Health Reports, vol. 57, no. 36, p. 1327.

PREPARING MOSQUITO LARVAE FOR STUDY

For purposes of quick identification a freshly killed specimen in a drop of water on a glass slide is sufficiently prepared. Details, however, are far more easily seen when the specimen is cleared and mounted on a slide, and for careful study this procedure is imperative.

KILLING AND STORAGE. Any means of killing larvae that avoids shrinkage and distortion is satisfactory. A convenient method is to place the specimen on a clean slide in a drop of water and hold for a few moments on a hot shade of a desk lamp. The specimen then may be mounted directly on the same slide, thus avoiding undue handling. Large numbers of specimens may be killed at the same time by dropping them in hot water. Another method is to place them in a watch glass or small dish and place paper moistened with formalin or chloroform above the dish and cover with a beaker. For storing specimens run through 50% then into 70% alcohol and place in vials with cotton inserted to prevent movement or breakage. In shipping it is best to place larvae in a small vial, completely filled with alcohol and cotton-stoppered, within a larger vial of alcohol.

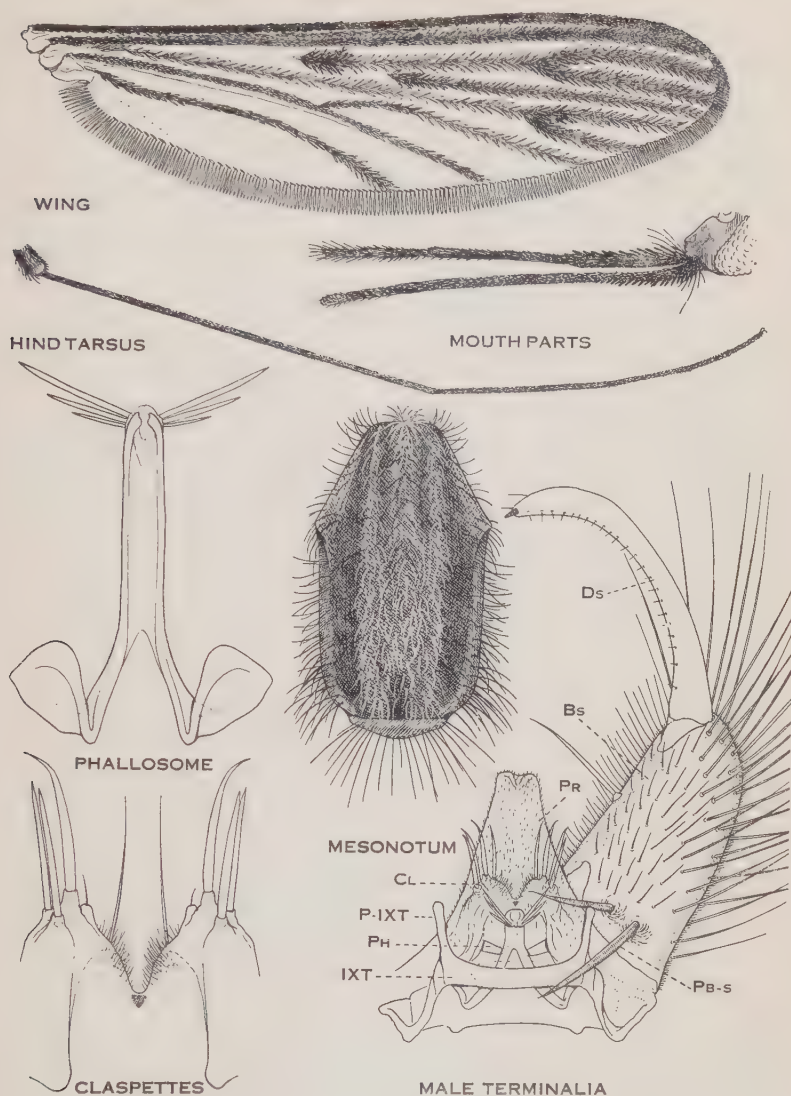
CHLOROL-GUM MEDIA. Berlese's medium or one of its modifications, largely composed of chloral hydrate, is advantageous as no dehydration is necessary although the permanency of the mount is open to question. The formula given by King, Bradley and McNeel, 1942, follows:

Distilled water.....	8 cc.	Chloral hydrate.....	70 gm.
Gum arabic (dry).....	8 gm.	Glacial acetic acid.....	3 cc.
Glycerin.....	5 cc.		

Dissolve in water using a water bath in the sequence listed above; then strain through muslin.

TECHNIQUE OF MOUNTING IN CHLOROL-GUM MEDIA. If the specimen has been preserved in alcohol, rinse in distilled water first. For culicines the last few segments of the abdomen should be pinched off with a needle to allow this terminal portion to lay on its left side. This may also be done for anophelines if it is desired to see the pecten. Placing specimen on center of slide, blot off all excess water and cover with two or three drops of the medium. Place ground glass or thin strips of paper not thicker than specimen on either side to prevent crushing by cover-slip. Hold cover-slip between thumb and index finger and drop quickly on mount. The slide should be kept in a horizontal position for a few weeks until the medium becomes hardened. This process may be much hastened if a drying oven is used. The edge of the cover-slip should then be ringed or sealed with some agent such as clarite, cellulose cement, brunswick black, etc.

TECHNIQUE OF MOUNTING IN CLARITE OR BALSAM. For mounting specimens in these media which have xylol as a solvent, it is necessary to dehydrate the larva first. A satisfactory method is to run it through 50%, 70% and 95% alcohols, clove oil (or absolute alcohol) and xylol, then mount on slide as described above. Too rapid changes in steps of dehydration will cause shrinkage, and undue handling may break off many hairs and bristles. This procedure may be done in a series of dishes or watch glasses with a small tool to transfer the specimens. Allow the specimens to remain in each change at least 15 to 20 minutes. A satisfactory technique is to take 6 or 8 specimens at once each on a slide resting on two parallel glass tubes. Take first slide and place one end down in a syracuse watch glass or petri dish so that the water runs off without moving specimen, then flush slowly with a few drops of 50% alcohol. Place back on rack and add 3 or 4 more drops of 50% alcohol. Proceed in same manner with other slides. Then repeat same process with 70%, then 95% alcohol, and then into the clearing oil. The specimen should be kept in the oil until it is entirely clear or transparent. Care must be taken not to allow specimen to dry at any time. Continue into xylol and mount in the clarite or balsam. Such mounts are ready for immediate study, whereas the chloral hydrate (Berlese) medias may require several hours or days before specimens become entirely cleared or transparent. The media with the xylol solvent take some days to harden. Ringing or sealing is unnecessary. Label all slides at once with full locality data, date and name of collector.

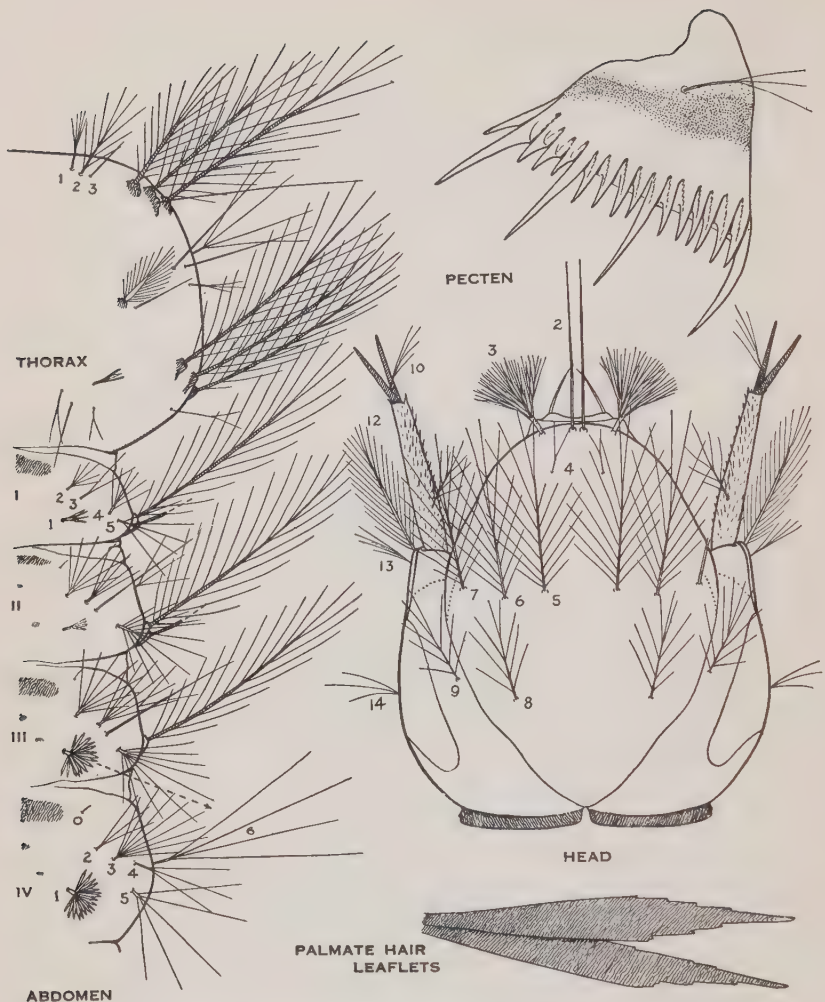


ANOPHELES (ANOPHELES) MACULIPENNIS FREEBORNI Aitken, 1939

The important vector of malaria in western United States.

Identification. ADULT FEMALE: The only dark-winged species within its range (see map, p. 9). May be confused with *A. m. occidentalis* in its western and northern limits, but separated by absence of bronzy apical wing spot. In southeastern limits of range it may overlap *A. quadrimaculatus* but is separated by dorsal claspette spines of terminalia and by larvae; females difficult to separate. Adults very similar to those of *A. m. aztecus*. See pp. 9 and 10 for further discussion of American *maculipennis* complex.

Habits. Readily enters houses and avidly feeds on man. Adults become reduced in numbers during midsummer. Winters through in the adult stage (females only).



ANOPHELES (ANOPHELES) MACULIPENNIS FREEBORNI Aitken, 1939

Identification. HEAD: inner clypeal hairs (2) with basal tubercles close together; outer clypeals (3) densely branched, fan-shaped; posterior clypeals (4) with two (or three) branches only. ABDOMEN: hair 0 on segment IV obsolete; palmate hairs (1) on segments I and II very weakly developed. No very satisfactory characters have been found to separate this larva from that of *A. punctipennis*.

Habitat. Most frequently associated with irrigated or seepage areas. Favors clear, shallow, sunlit water with presence of some algae. Unlike *A. quadrimaculatus* it does not show a preference for larger water areas such as ponds and lakes.

Distribution. Except narrow Pacific coastal strip from above Santa Barbara to the north, occurs throughout western United States west of the Rocky Mountain Divide and in addition the El Paso Region of Texas, most of New Mexico, and northwestern Mexico.

Illustrated specimens (adult female and larva) from Horse Shoe Bend, Boise Co., Idaho; (male terminalia) from Marysville, California.



ANOPHELES MACULIPENNIS complex of North America

A. maculipennis occidentalis Dyar and Knab, 1906, type locality: Stanford University, Santa Clara Co., California, U. S. A.

A. maculipennis freeborni Aitken, 1939, type locality: Davis, California, U. S. A.

A. maculipennis aztecus Hoffmann, 1935, type locality: Valle de Mexico, Mexico.

The *maculipennis* complex of subspecies occurs in the Holarctic Region or North Temperate Zone of the World. Six subspecies have been recognized in Europe, primarily on differences of egg structure. The recognition of these subspecies is important because of their varying capacity as vectors of malaria. More recently three subspecies have been distinguished in North America. Bates (1940) has suggested

that these American members of the complex may be sufficiently differentiated to be recognized as a distinct species. Further study will be necessary to clarify the status of these American subspecies and also their apparent close relationship to *A. quadrimaculatus*. This latter species is not easily distinguished from members of the *maculipennis* complex and is certainly complimentary in distribution.

For the purpose of identification these subspecies may best be recognized on the basis of their distribution, until their morphological differences and range of variation are better known.

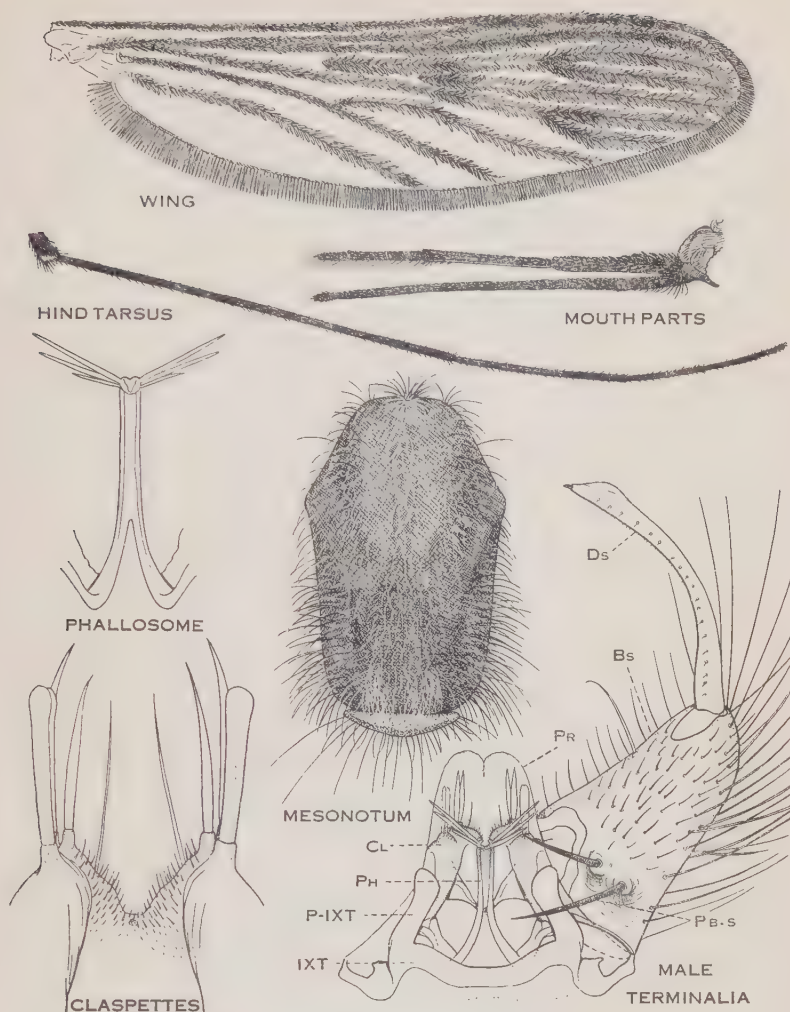
DIFFERENTIAL STRUCTURES

A. m. occidentalis. ADULT FEMALE: yellowish apical wing spot. MALE TERMINALIA: process of 9th tergite (P-IXT) very broad, often expanded apically, and bluntly rounded or obliquely truncate at apex. Similar in this respect to *A. quadrimaculatus*, but easily separated from the latter since all the spines of the claspettes are pointed. LARVA: basal tubercles of inner clypeal hairs (2) separated by less than the width of a tubercle; posterior clypeal hairs (4) multiple; antepalmate hairs (2) of 4th and 5th abdominal segments single. EGG: 12 to 13 float chambers.

A. m. freeborni. ADULT FEMALE: no apical wing spot. MALE TERMINALIA: process of 9th tergite (P-IXT) long, slender, blade-like. LARVA: basal tubercles of inner clypeal hairs (2) separated by less than the width of a tubercle; posterior clypeal hairs (4) two or three branches only; antepalmate hairs (2) of 4th and 5th abdominal segments with two or three branches; larvae very similar to *A. punctipennis*. EGG: 12 to 13 float chambers.

A. m. aztecus. ADULT FEMALE: no apical wing spot. MALE TERMINALIA: closely similar to that of *freeborni*. LARVA: basal tubercles of inner clypeal hairs (2) separated by more than width of a tubercle. EGG: 17 to 26 float chambers.

The above subspecies have the claspette spines of the male terminalia all tapered to a point in contrast to the other dark wing *Anopheles* of North America, all of which have two or more pair of capitate or blade-like spines. Though *A. punctipennis* has white spotted wings, its terminalia and larva are very similar to those of the *maculipennis* complex.

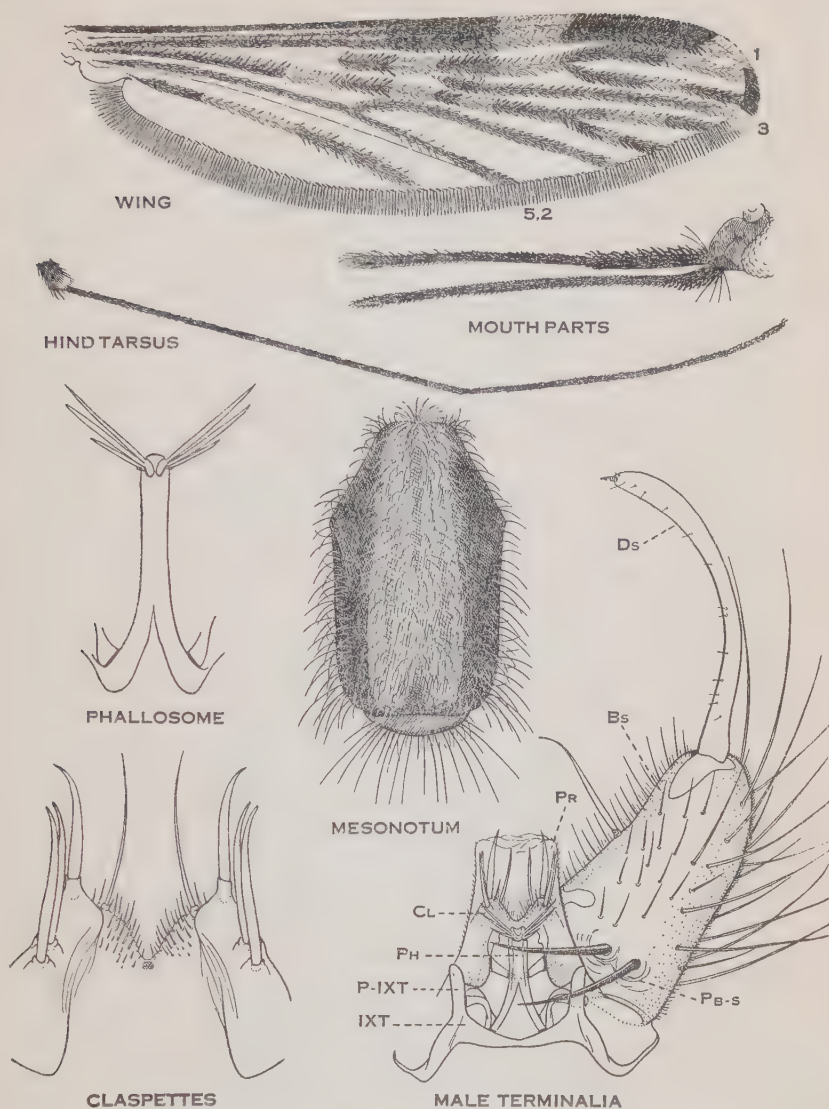


ANOPHELES (ANOPHELES) QUADRIMACULATUS Say, 1824

The important vector of malaria in eastern United States.

Identification. ADULT FEMALE: wing scales all dark, some forming four blackish spots; palpi and hind tarsi black; femora with small white spots at tip, "knee spots". Overlaps range of *A. m. occidentalis* in north, but distinguished by absence of silvery or golden fringe on wing tip. MALE TERMINALIA: processes of 9th tergite (P-IXT) prominent, apically expanded; phallosome (PH) with three pairs of non-serrate leaflets; claspette spines with two dorsal-most pair of spines club-shaped, partly fused together.

Habits. Nocturnal, chiefly dawn and dusk. Effective flight range about 1 mile. Feeds chiefly on man, horses, and cattle. Rests during day in dark corners, chimneys, outhouses, privies, tree-holes, culverts, under bridges, etc.; frequently on old spider webs. Winters in adult stage (females only).

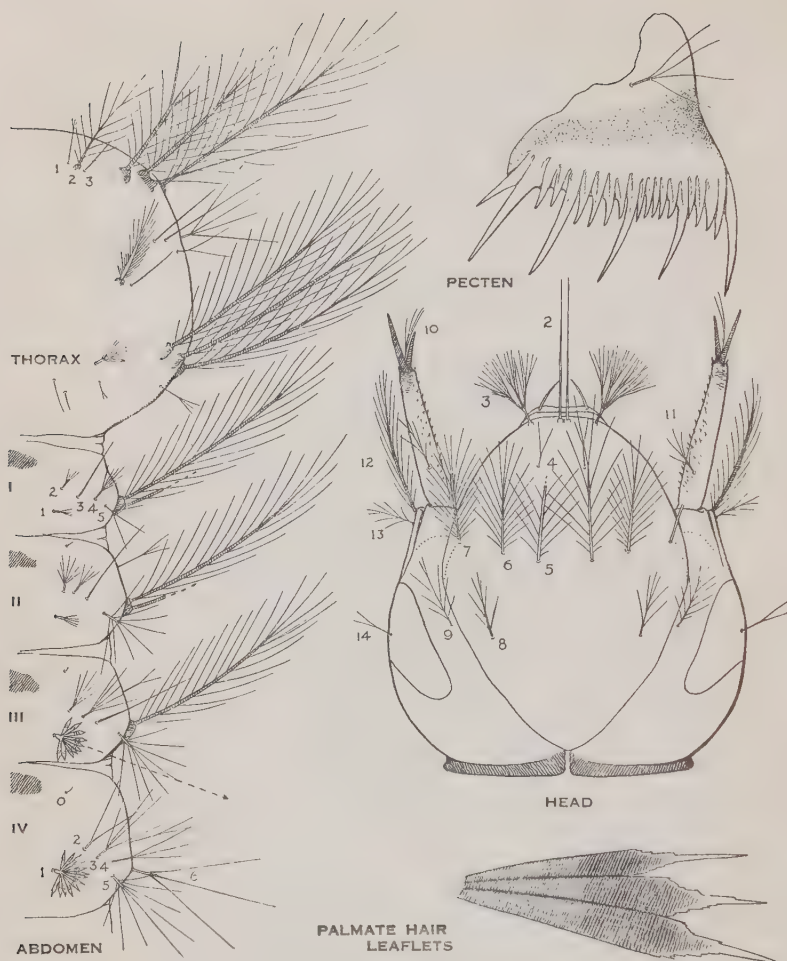


ANOPHELES (ANOPHELES) PUNCTIPENNIS (Say), 1823

Identification. ADULT FEMALE: anterior margin of wing with only one sub-apical white area (at times obsolete); basal half of vein 1 entirely dark; fringe dark except at end of vein 3 and rarely at end of vein 5.2. Hind tarsi and palpi entirely dark. Mesonotum with a broad, median, longitudinal, grayish-white band. MALE TERMINALIA: Basistyle (Bs) with one internal (It-s) and two parabasal (PB-s) spines; phallosome (PH) leaflets well developed, non-serrate; claspettes with apical spine sharply pointed, the two spines dorsal to apical spine bluntly tipped, may be absent or but one present (highly variable), ventral or inner-most spine usually long, slender.

Habits. Usually bites at dusk, seems to prefer animal blood to that of man. Frequents porches and verandas, seldom entering dwellings.

SYNONYMS. *Culex hyemalis* Fitch, 1847; *Anopheles perplexens* Ludlow, 1907; *A. p. stonei* and *A. p. typicus* Vargas, 1941.



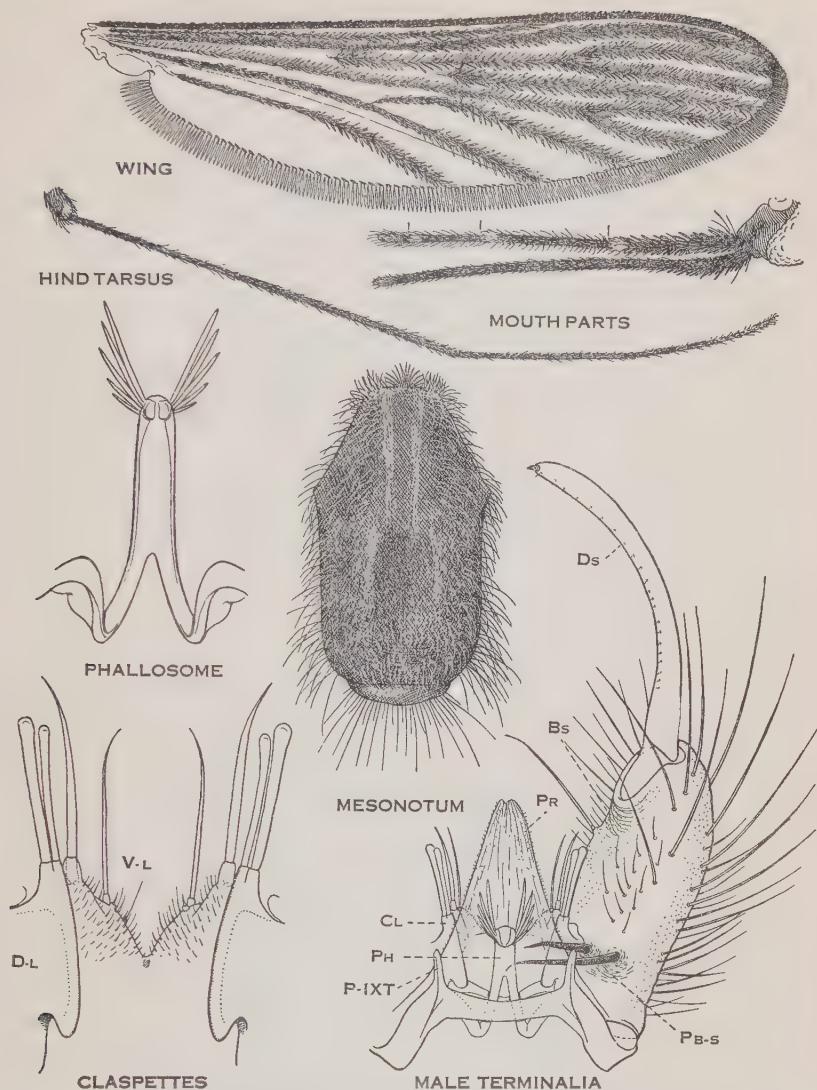
ANOPHELES (ANOPHELES) PUNCTIPENNIS (Say), 1823

Identification. HEAD: outer clypeal hairs (3) densely branched, fan-shaped; inner clypeals (2) with basal tubercles close together. ABDOMEN: hair 0 on segment IV obsolete; palmate hairs (1) on segments I and II very weakly developed. No satisfactory characters have been found to separate this larva from that of *A. maculipennis freeborni*.

Habitat. Found in a very wide variety of breeding places. Prefers cooler water as compared to *A. quadrimaculatus*, in southern United States most common in late fall and early spring, becoming scarce in summer.

Distribution. Southern Canada, eastern portion of U. S. to Rocky Mountain region, Pacific Coast states, and highlands of Mexico. Type locality: "Eastern Shore of Maryland."

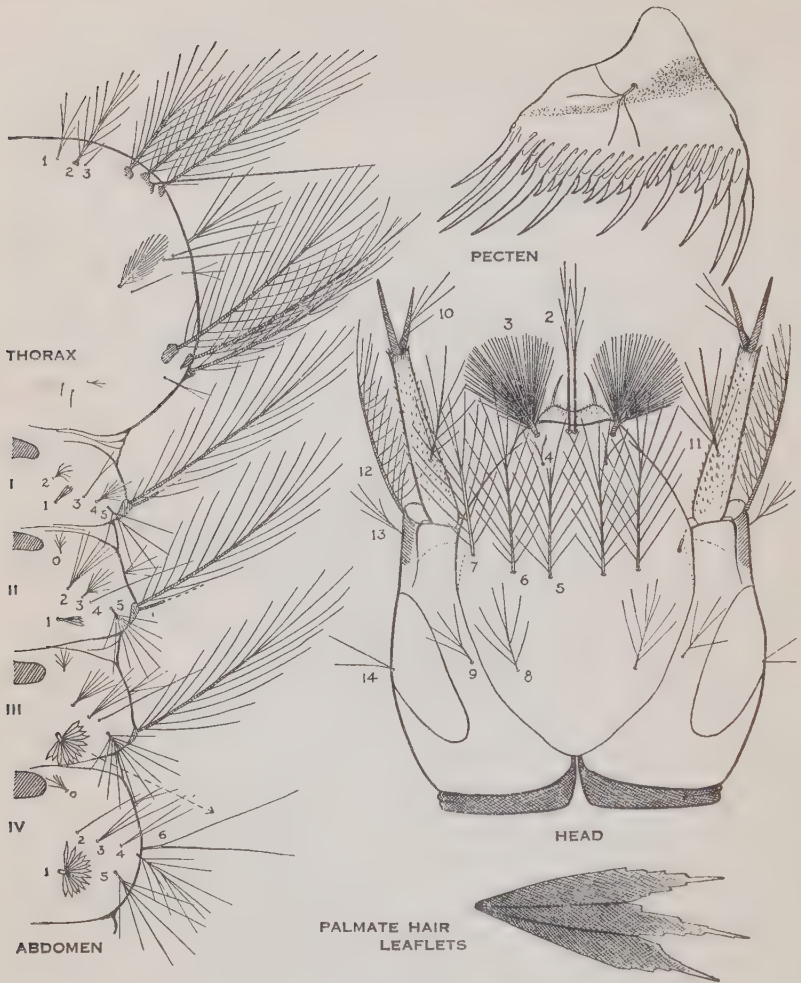
Illustrated specimens: (adult female) from Kerrville, Texas; (male terminalia) from Camp Chaffee, western Arkansas; larva from San Antonio, Texas.



ANOPHELES (ANOPHELES) WALKERI Theobald, 1901

Identification. ADULT FEMALE: wing with all scales dark, some forming four slightly darker spots. Palpi with three narrow, distinct, white rings. Mesonotum brownish black with a faint pair of pale stripes on anterior portion, seen only with illumination from posterior direction. White "knee spots" on hind femora. MALE TERMINALIA: basistyle (Bs) without scales; processes of 9th tergite (P-IXT) short, narrow; phallosome (PH) with 5 pairs of distinct, non-serrate leaflets; dorsal lobe of claspette (CL) with two separate, capitate, elongate spines; ventral lobe of claspette with one large, sharply pointed spine, and one internal.

Habits. Readily bites man not only at night but even in bright sunlight. Reported to remain near breeding place, but will rest in barns, under culverts, etc.



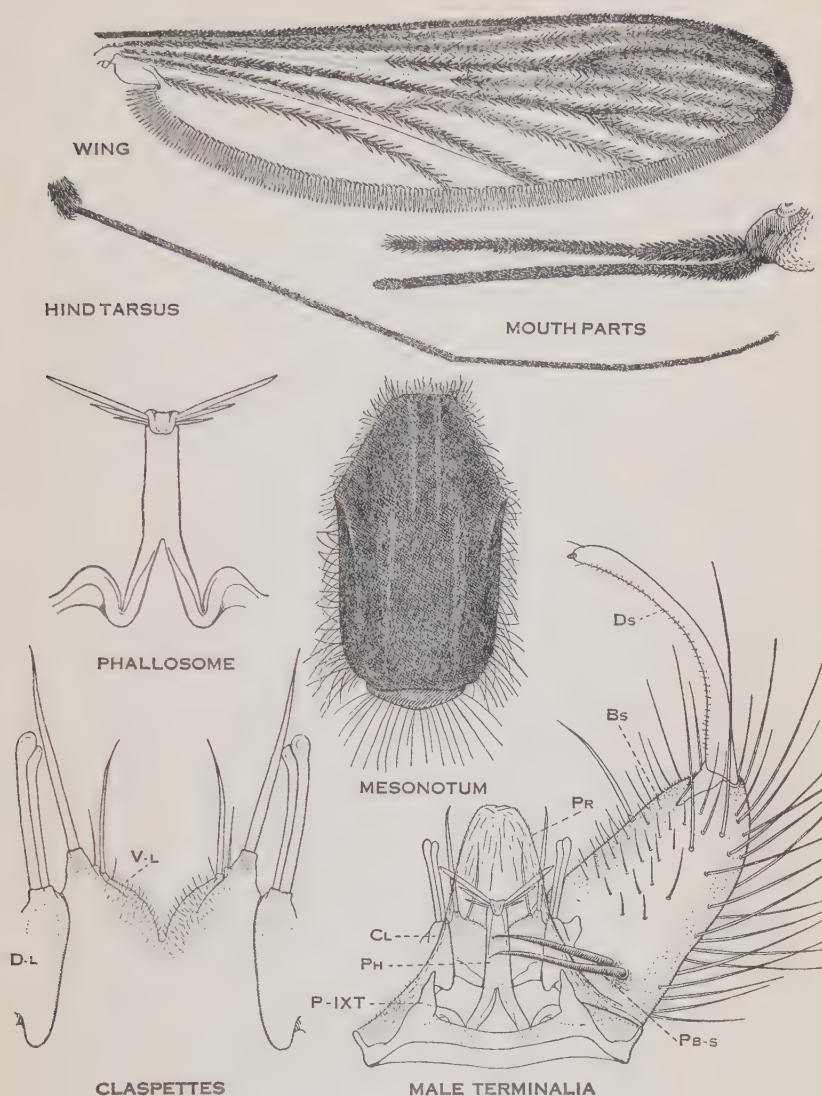
ANOPHELES (ANOPHELES) WALKERI Theobald, 1901

Identification. HEAD: outer clypeal hair (3) very densely branched, broadly fan-shaped from near base; inner clypeals (2) close together, finely branched in apical half. THORAX: prothoracic hair 1 slightly branched. ABDOMEN: lateral hair 6 two or three-branched on segment IV; palmate hair (1) well developed on segments III to VII; hair 0 distinct and many-branched on segments II to VII. Separated from *A. c. crucians* by stronger branching of prothoracic hair 1.

Habitat. Breeds in sunny marsh pools or lake margins among thick growths of aquatic vegetation.

Distribution. Widespread in eastern U. S. A., east of the Great Plains and in southeastern Canada. Also reported from Mexico. Not as rare as formerly believed. Type locality: Lake Simcoe, Ontario, Canada.

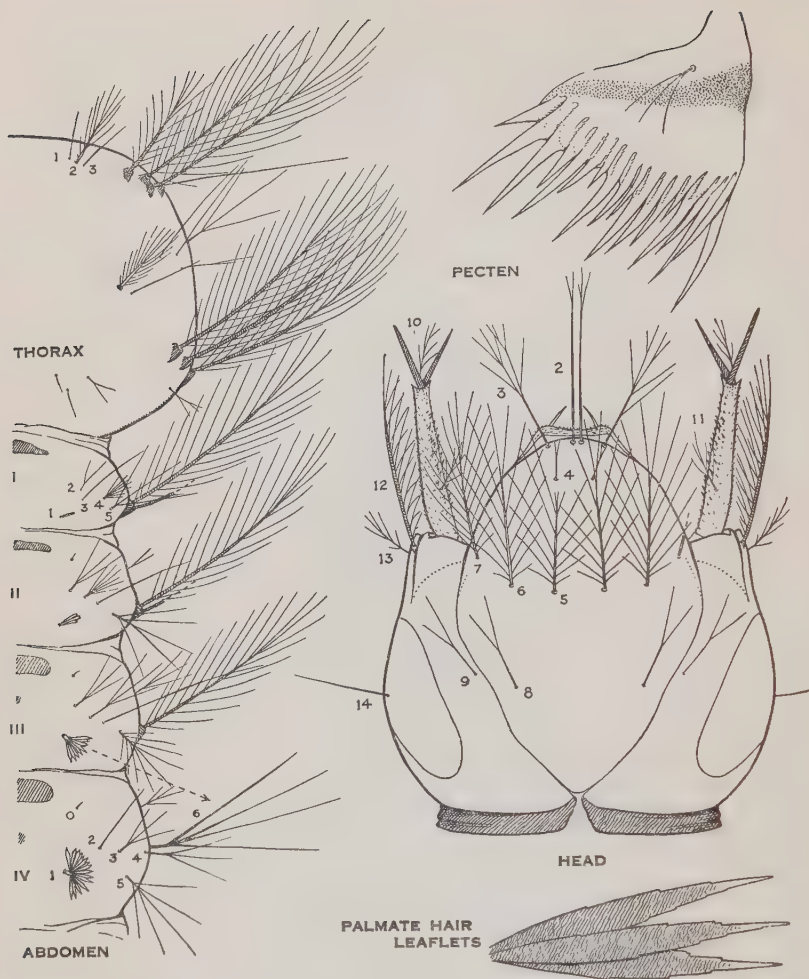
Illustrated specimens from Kellogg (larva) and Wabasha (adults), Minnesota.



ANOPHELES (ANOPHELES) ATROPOS Dyar and Knab, 1906

Identification. ADULT FEMALE: wings entirely dark, without distinct darker spots. Palpi with very faint, yellowish, apical rings on segments or entirely dark. No whitish "knee spots" at distal end of hind femora. Mesonotum with faint, longitudinal, white stripes, if seen with light from posterior direction. MALE TERMINALIA: phallosome (PH) stout, leaflets prominent and non-serrate; claspette (CL) with two pairs of capitate, non-fused, stout spines on dorsal lobe (D-L), ventral lobe (V-L) with two pointed, tapering spines. Similar to *A. walkeri*, but with subterminal pair of phallosome leaflets only half as long as terminal pair.

Habits. A severe biter by day or night, readily entering dwellings. Attracted to light traps.



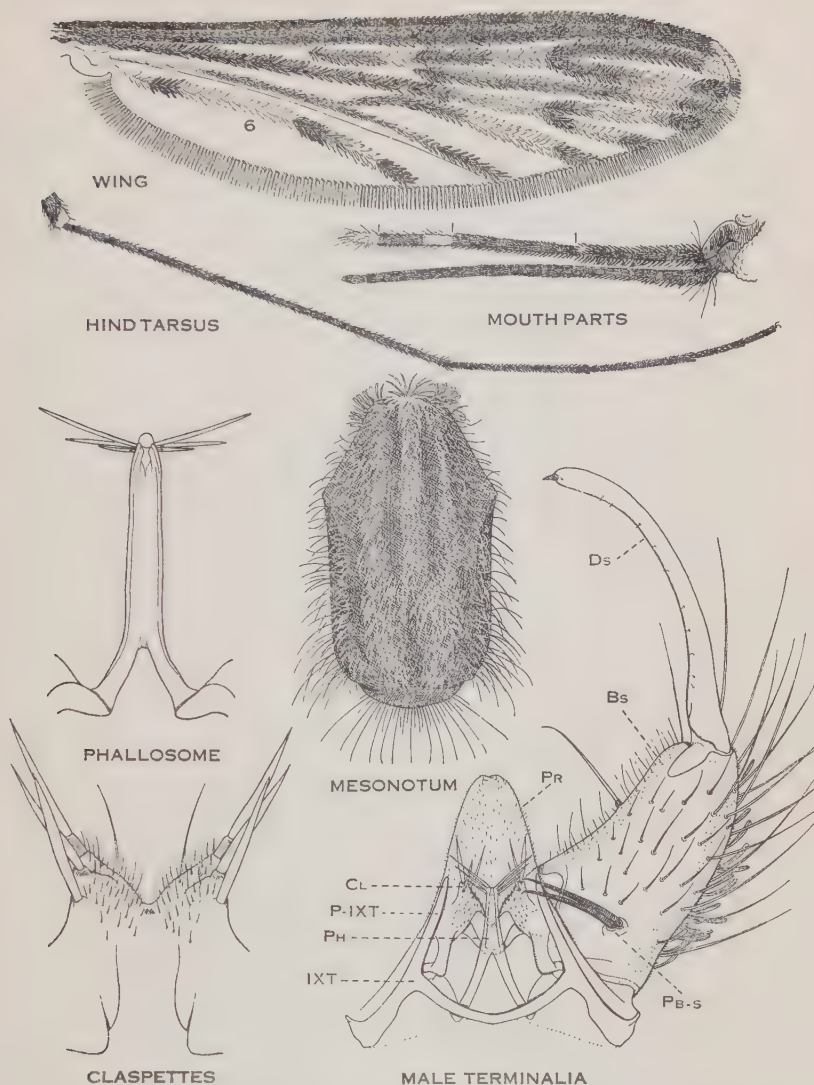
ANOPHELES (ANOPHELES) ATROPOS Dyar and Knab, 1906

Identification. HEAD: outer clypeal hairs (3) with distal half sparsely branched, 7 to 12 branches only; bases of inner clypeals (2) close together, minutely branched at extreme tip; sutural hairs (8, 9) with distal half forked; orbital hairs (14) single. ABDOMEN: hair 0 obsolete; palmate hairs (1) fully developed on segments IV to VII only, that on segment III partially developed.

Habitat. Coastal salt marshes. Reported to occur in pools, shallow water, muck, and alluvial marshes, with 3 to 12% sea water.

Distribution. Coastal salt marshes from Maryland to Texas, and Cuba. Type locality: Florida Keys, U. S. A.

Illustrated specimens (adults and larva) from MacDill Field, Tampa, Florida, except pecten of larva from Crisfield, Maryland.

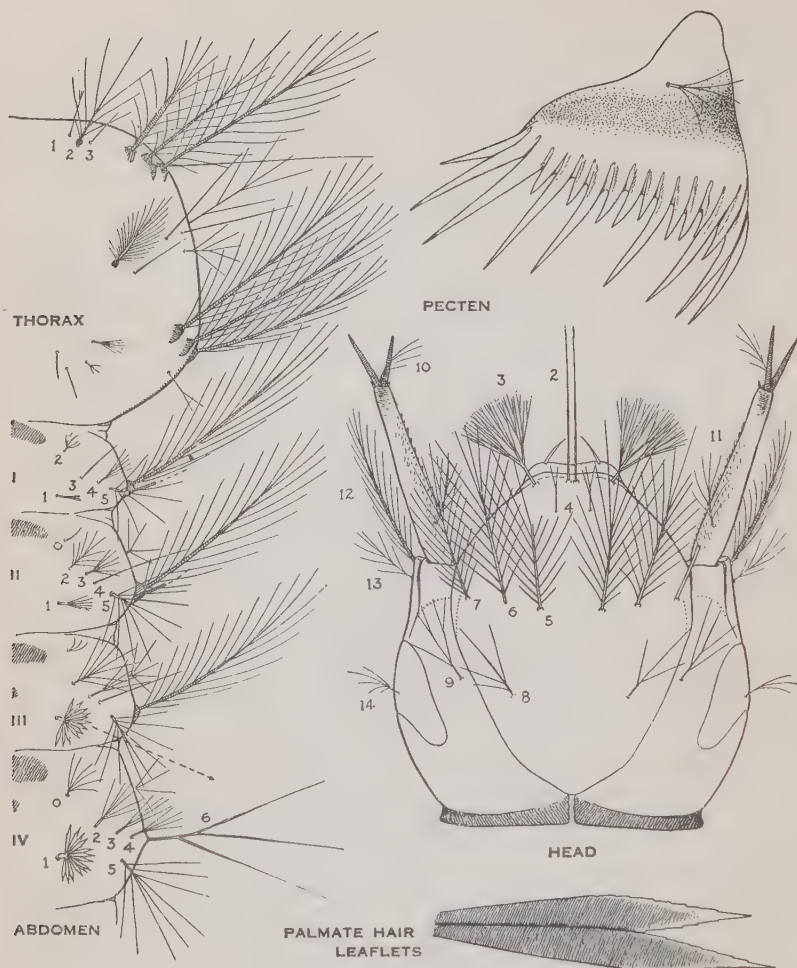


ANOPHELES (ANOPHELES) CRUCIANS CRUCIANS Wiedemann, 1828

Identification. ADULT FEMALE: Sixth longitudinal vein (6) white with three dark spots; anterior margin of wing entirely black. Hind tarsi black, palpi with white markings. Mesonotum with lanceolate scales. MALE TERMINALIA: basistyle (Bs) with scales; processes of 9th tergite (P-IXT) very elongate, phallosome (Ph) leaflets prominent, non-serrate; claspette (CL) with three large, subequal, tapered spines and one small, slender spine; dorsal and ventral lobes of claspette not differentiated.

Habits. Primarily bites outdoors (day or night), but may invade dwellings.

Illustrated specimens (adults and larva) from Luling, Texas, U. S. A.

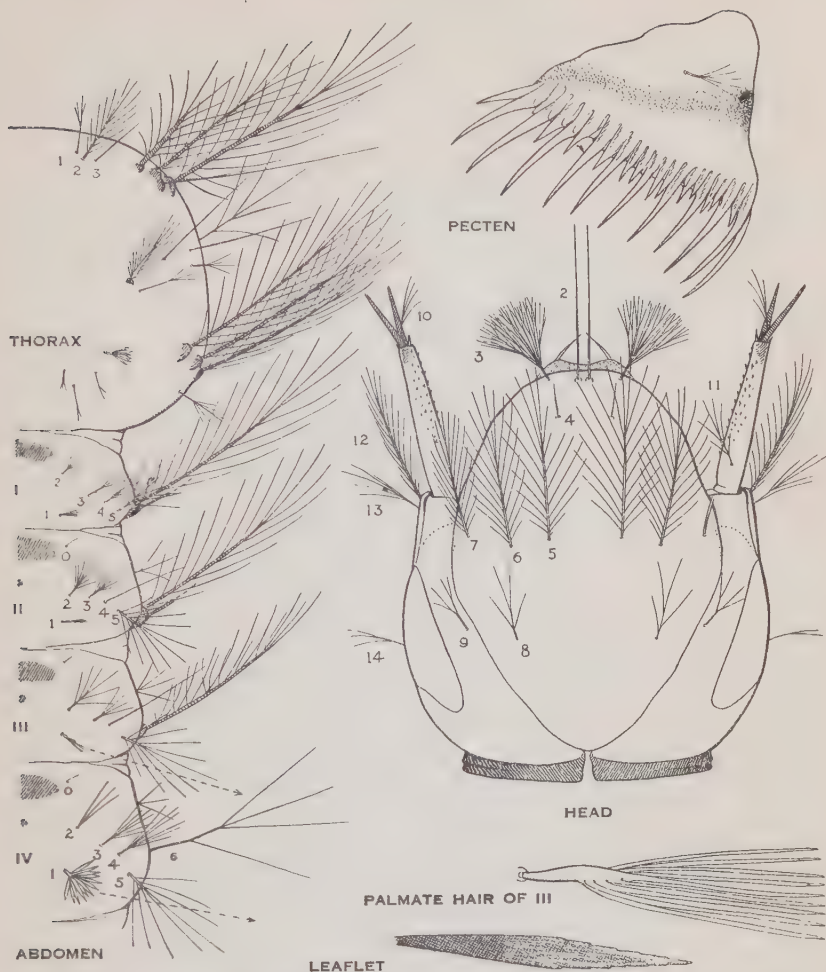


ANOPHELES (ANOPHELES) CRUCIANS CRUCIANS Wiedemann, 1828

Identification. HEAD: outer clypeal hairs (3) densely branched, fan-shaped; inner clypeals (2) single, bases closely approximated. ABDOMEN: hair 0 unusually well developed especially on segment IV; palmate hairs (1) well developed on segments III to VII. Separated from *A. walkeri* by simplicity of hair 2 of head, and of hair 1 of prothorax.

Habits. Breeds in swamp pools, usually partly shaded, and prefers slightly acid water. May spend the winter in larval stage. The larvae found in salt marshes are usually *A. c. bradleyi*, though the two subspecies may overlap in water of very low salinity.

Distribution. Widespread in eastern U. S. A. from Massachusetts south, most common on coastal plain. Recorded from Artesia, New Mexico, by Barber (1939). Extends down Gulf coast to Honduras and occurs in West Indies. Type locality: Pennsylvania (and New Orleans).



ANOPHELES (ANOPHELES) CRUCIANS GEORGIANUS King, 1939

Adult not clearly if at all separable from other subspecies of *A. crucians*.

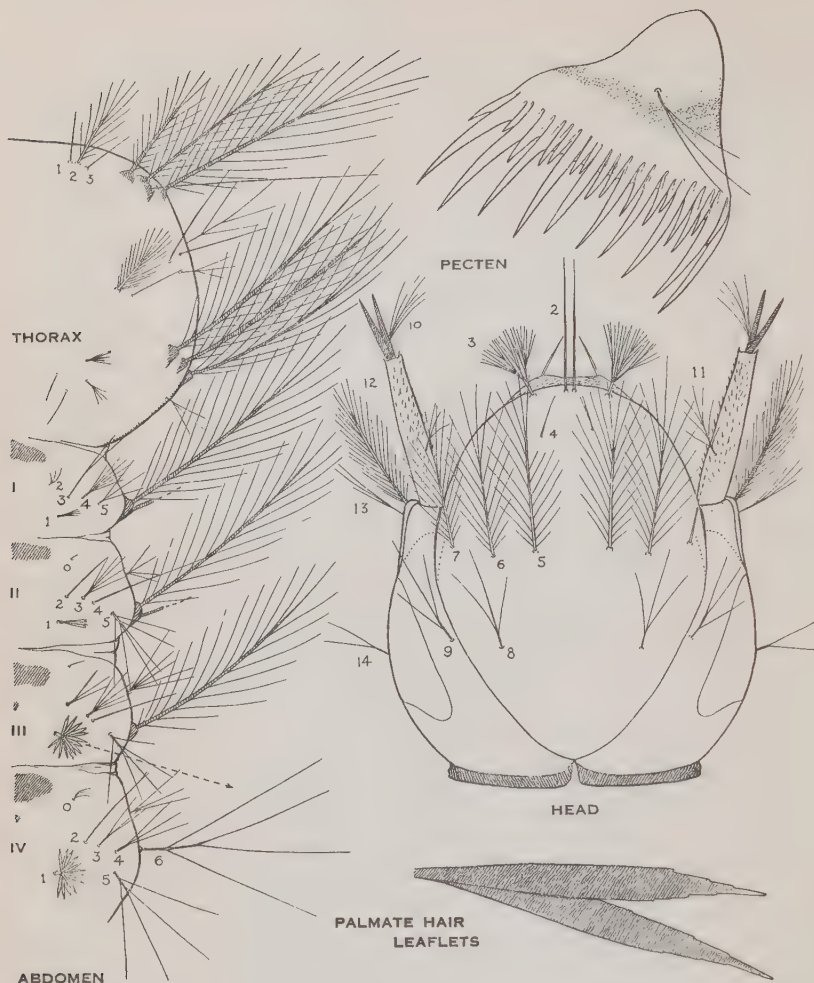
Identification. HEAD: similar to *crucians* and *bradleyi*. ABDOMEN: presence of only three pairs of palmate hairs (1) well developed (segments IV to VI) distinguishes this form from all others in North America; hair 0 single or double when present.

Habitat. Pools, hoof prints and other depressions in boggy seepage areas. When dipped up, usually associated with black muck, and do not readily rise to the surface. Sometimes found with *crucians* in larger pools. Winters in larval state.

Distribution. Southern Georgia to eastern edge of Texas. Type locality: Quitman, Brooks Co., Georgia.

Illustrated specimen from Ft. Jackson, Georgia, U. S. A.

Though this subspecies and *bradleyi* were described as varieties of *A. crucians*, and later given the status of separate species, they are here considered as subspecies. This will best indicate their close relationship. However, they are certainly not geographical subspecies, i.e., from distinct geographical areas, but rather appear to be ecological subspecies. Whether these subspecies will interbreed or whether one reared in the environment of the other will maintain the true larval form, needs investigation.



ANOPHELES (ANOPHELES) CRUCIANS BRADLEYI King, 1939

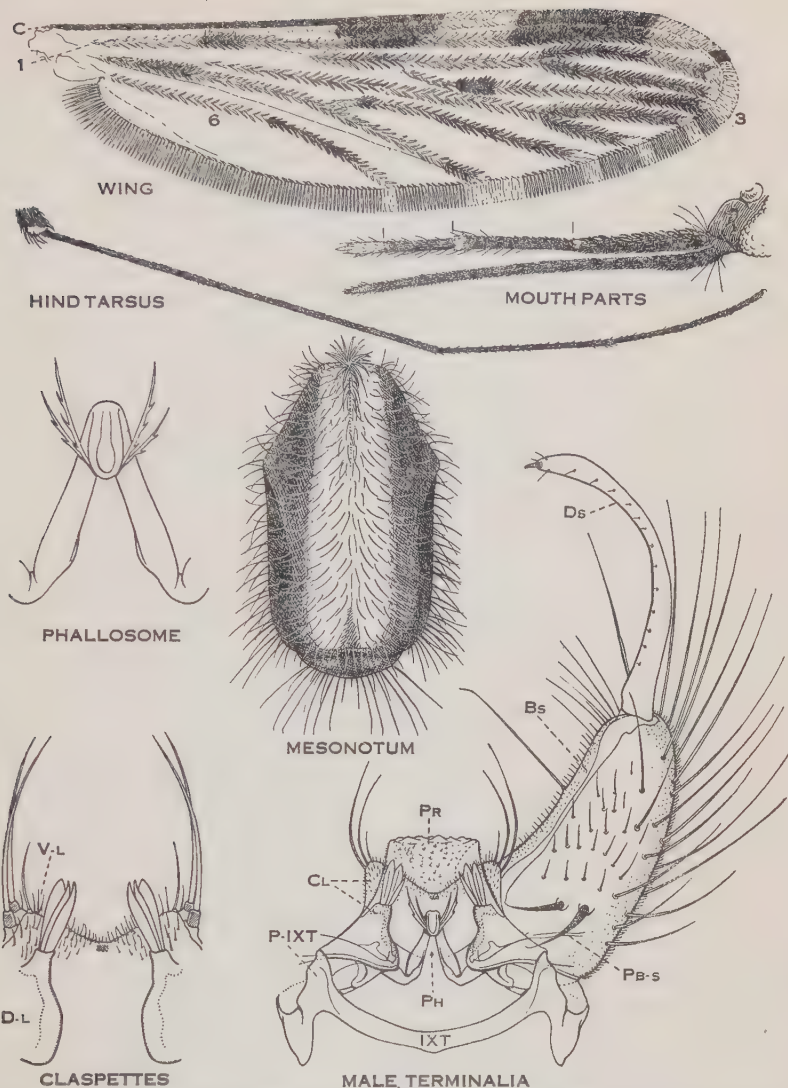
Adult not clearly if at all distinguishable from other subspecies of *A. crucians*.

Identification. HEAD: (not distinctive from the other subspecies) inner clypeal hairs (2) with bases close together or in some cases separated by more than width of basal tubercle; occipital hairs (8, 9) only 3 to 4-branched. ABDOMEN: palmate hair (1) of segment III well developed, its leaflets gradually tapered and weakly notched (distinguishing it from *A. punctipennis*); hair 0 on segment IV very small; pecten usually with no more than 2, occasionally 3, short teeth between each long tooth (cf. *A. maculipennis freeborni* and *A. punctipennis*).

Distribution. Atlantic and Gulf coasts from Maryland, U. S. A. to Veracruz, Mexico. Type locality: St. Johns River, Brevard Co., Florida.

Habitat. Brackish water of low salinity near the coast.

Illustrations based on larval skin of type.



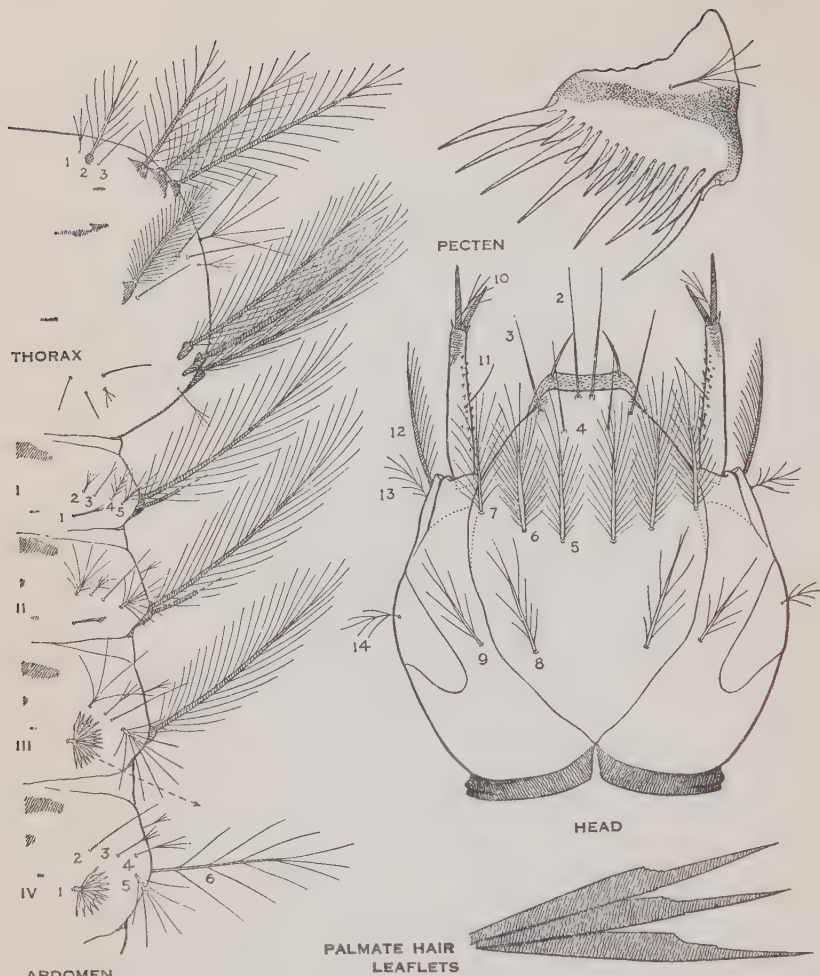
ANOPHELES (ANOPHELES) P. PSEUDOPUNCTIPENNIS Theobald, 1901

An important malaria vector in the highlands of Mexico, Central America, and Argentina.

Identification. ADULT FEMALE: wing with no white spots at base of costa (C); Vein 1 with two broad white areas in basal half; vein 3 white in middle; vein 6 with a single black area. Fringe white at end of veins. Mesonotum with a broad, pale stripe. Hind tarsi black. MALE TERMINALIA: 9th tergite with short processes (P-IXT); claspette (CL) with three blade-like spines on dorsal lobe (D-L), and two long, slender, hair-like spines on ventral lobe (V-L); phallosome (PH) strongly curved dorsad, leaflets fine, serrate.

Distribution. South central U. S. A.; Mexico; Central America; Grenada, B. W. I. (type locality); Trinidad; Andean region of South America from Venezuela to Argentina. Favors dry mountainous areas.

Habits. At least in some areas readily enters houses and attacks man. *A. p. franciscanus* in contrast is said to rarely attack man or enter houses and is not regarded as a malaria vector in California.



ANOPHELES (ANOPHELES) *P. PSEUDOPUNCTIPENNIS* Theobald, 1901

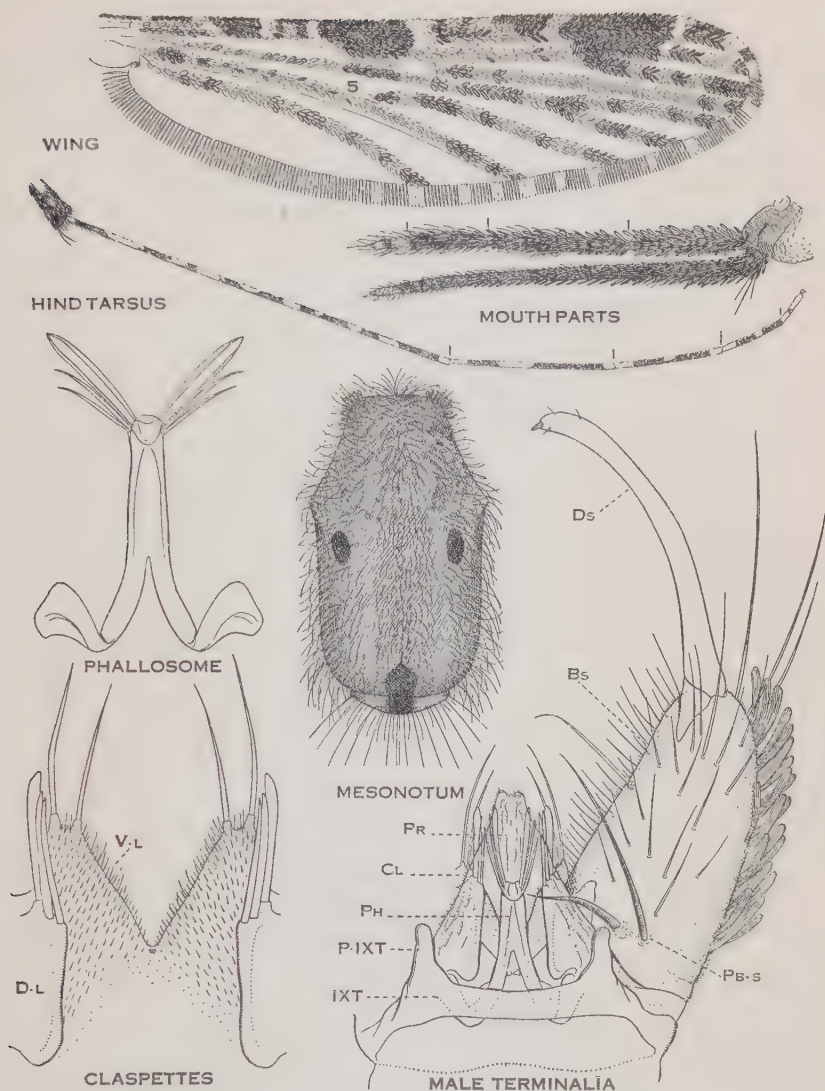
Identification. HEAD: Clypeal hairs 2 to 4 simple, nearly equal in length. ABDOMEN: lateral hairs (6) on segments IV to VI with coarse, pinnate branches; palmate hairs (1) well developed on segments III to VII, serrate. Posterior spiracular plates with distinct process or "tail" from inner caudal margins (absent in *A. p. franciscanus*).

Habitat. Warm sunny pools and most frequently associated with green algae. Illustrated specimens (adults and larva) from San Antonio, Texas.

Anopheles p. franciscanus McCracken, 1904

Occurs in southwestern U. S. A. and northwestern Mexico. Distinguished by absence of white on terminal segments of female palpus; absence of phallosome leaflets on male terminalia; absence of "tails" or process on posterior plates of spiracular sclerites in larva.

Several distinctive types of eggs have been found within the range of this subspecies. Two of these types were named by Vargas in 1939 and 1941, as new varieties, *boydi* and *willardi*. Until it can be established that these egg forms represent more than variations within the subspecies, the names must be regarded as synonyms of *A. p. franciscanus*.

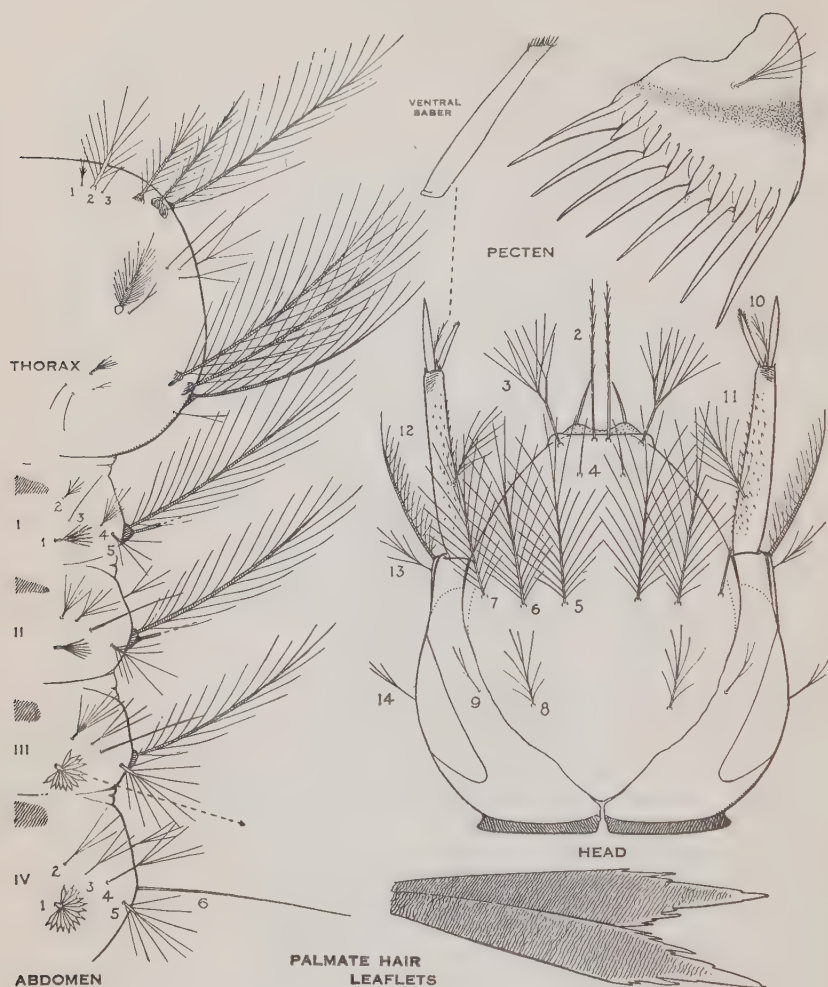


ANOPHELES (ANOPHELES) PUNCTIMACULA Dyar and Knab, 1906

Considered an efficient vector of malaria in Panama.

Identification. ADULT FEMALE: Wing with two prominent black circular patches on anterior portion; black spots but no definite patch at apex; stem of vein 5 with one definite black spot, remainder bronzy yellow with scattered black scales; wing scales very broad, ovoid. Palpus with terminal segment dark, whitish scales at base and apex. Mesonotum with three black spots, and covered with yellowish hairs (no scales except at anterior end). Hind tarsi with many white spots or rings. Abdomen with many tufts of black scales. MALE TERMINALIA: phallosome (PH) leaflets with terminal pair broad, lanceolate with median thickened rib and thin transparent margins; basistyle (Bs) with outer parabasal spine (Pb-s) long and slender as compared with the inner one.

Habits. Readily enters dwellings and feeds on man.



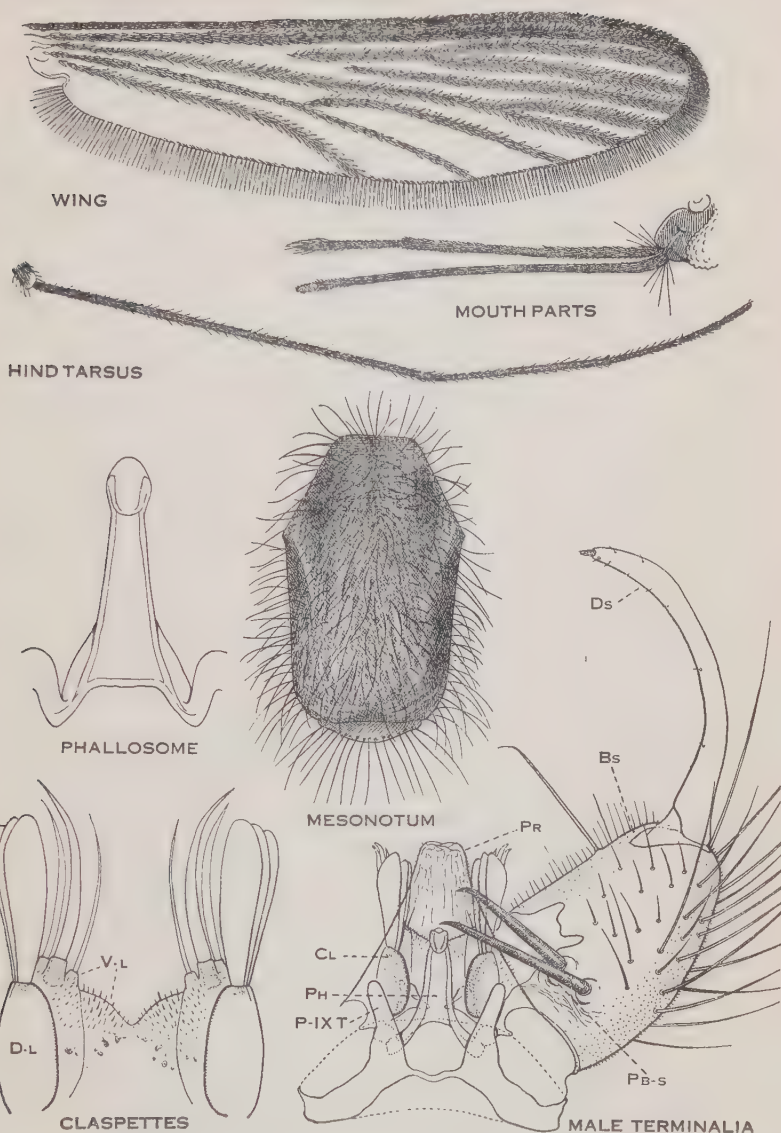
ANOPHELES (ANOPHELES) PUNCTIMACULA Dyar and Knab, 1906

Identification. HEAD: outer clypeal hairs (3) with about 12 or less branches; antenna with apex of ventral saber truncate and fimbriate. THORAX: prothoracic pleural hairs 9 to 11 unbranched (not illustrated). ABDOMEN: lateral hair 6 on segments IV to VI simple, unbranched; palmate hair (1) weakly developed on segment I and II, their leaflets on other segments deeply notched.

Habitat. Occurs in shaded jungle pools, swamps, and slowly flowing streams.

Distribution. Mexico, Central America, Trinidad, northern South America, Peru and Brazil. Type locality: Colon, Panama.

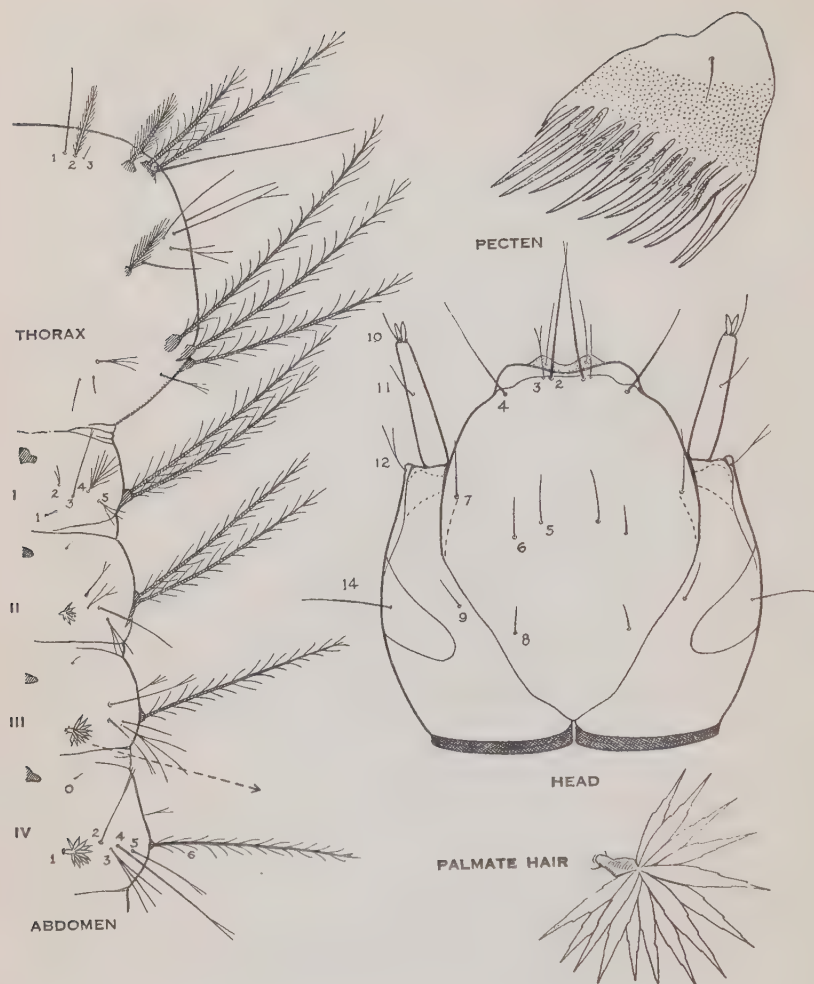
Illustrated specimens (adults) from Canal Zone, Panama; (larva except pecten) from Rio Seco, Costa Rica; (pecten) from Panama.



ANOPHELES (ANOPHELES) BARBERI Coquillett, 1903

Identification. ADULT FEMALE: A small species. Wing scales all dark with no darker spots. No white markings on palpi and legs. Mesonotum very shiny with sparse, long, black hairs. MALE TERMINALIA: basistyle (Bs) globular, without scales; parabasal spines (PB-s) very heavy; claspette (CL) with dorsal lobe (D-L) globose, sclerotized, with three blade-like, apically-rounded spines (these may be wrinkled in certain preparations); ventral lobe (V-L) with three unequal spines tapered to a point.

Habits. Enters dwellings and bites severely, however, because of its rarity, it is not important as a pest or vector of malaria.



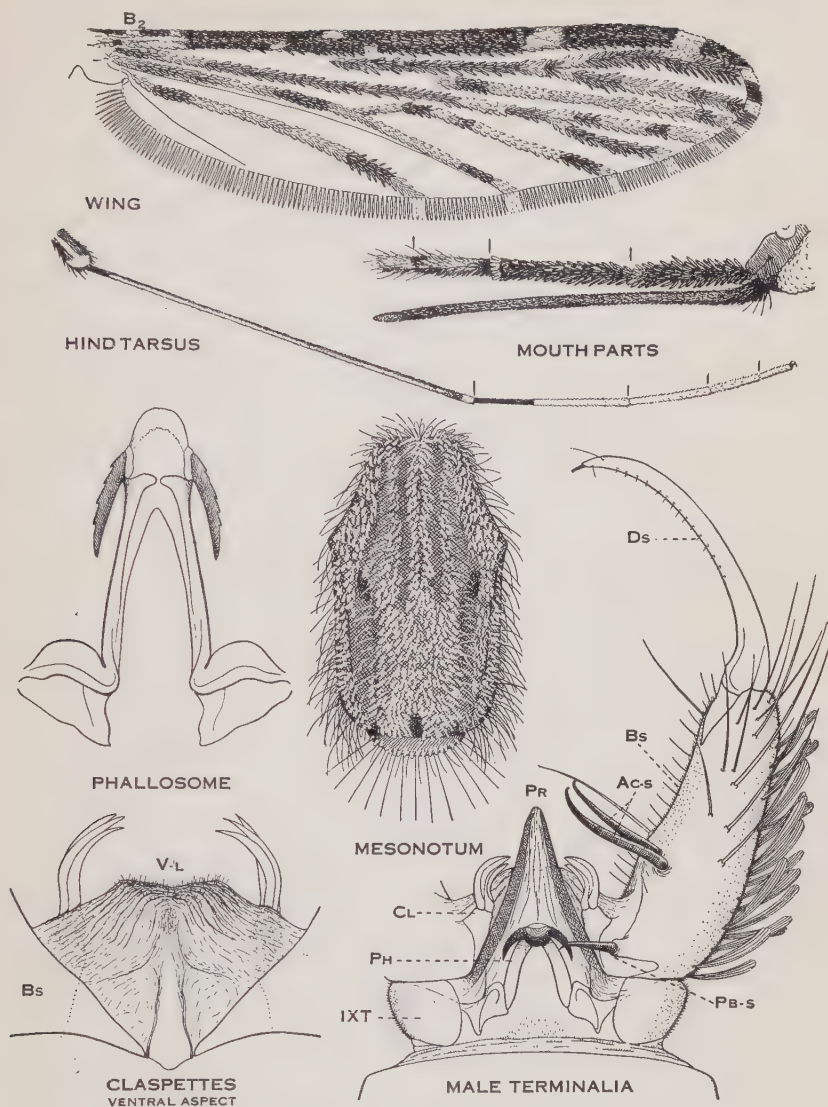
ANOPHELES (ANOPHELES) BARBERI Coquillett, 1903

Identification. HEAD: hairs much reduced and nearly all unbranched; inner clypeal hairs (2) simple, widely spaced; outer clypeals (3) greatly reduced; posterior clypeals (4) very much developed and in a lateral position; frontal hairs (5-7) faint, inconspicuous. ABDOMEN: darkly pigmented; lateral hair 6 plumose on segments IV and VI as well as on I to III, its lateral branches fine and short; pecten with nearly all teeth elongate, subequal.

Habitat. Tree-holes, also occasionally in artificial wooden receptacles in the shade. Found in company with *Aedes triseriatus*, *Orthopodomyia signifera*, and *Megarhinus septentrionalis*.

Distribution. Rare. Widespread in eastern U. S. A. Limitral range: New York to Florida, Missouri to Texas. Probably correlated with distribution of eastern hardwood forests. Type locality: Plummer's Island, Maryland.

Illustrated specimens (adults and larva) from Baton Rouge, Louisiana.

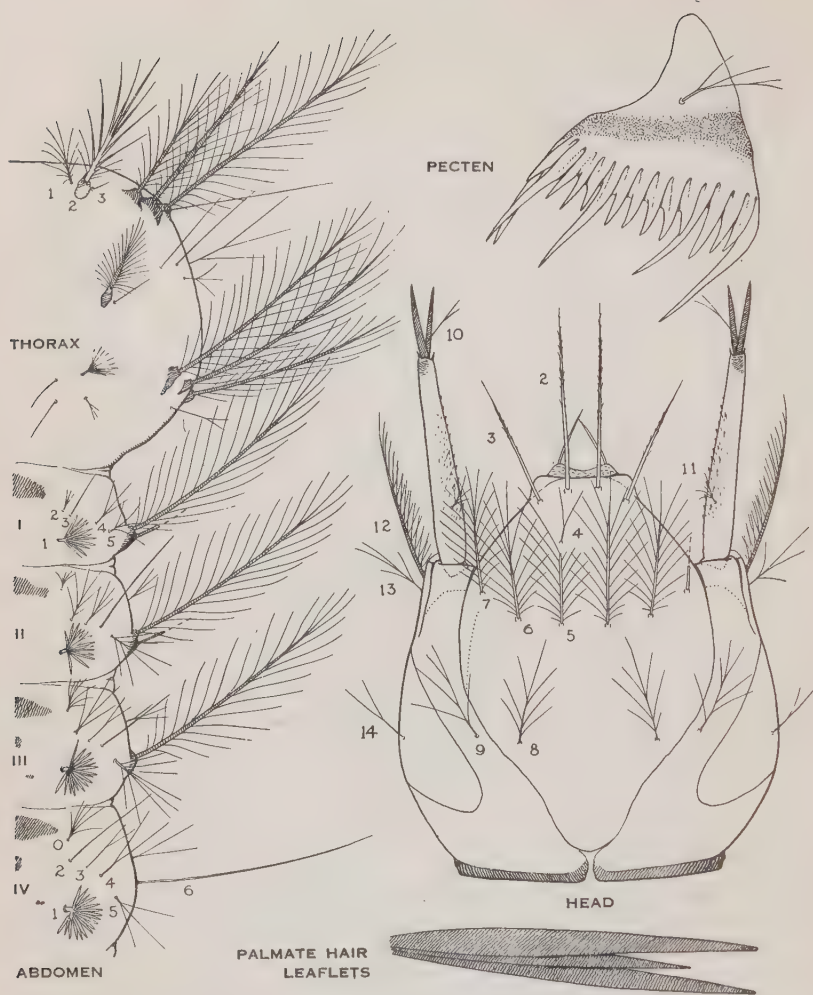


ANOPHELES (NYSSORHYNCHUS) DARLINGI Root, 1926

A most important and dangerous vector of malaria.

Identification. ADULT FEMALE: Distinguished with difficulty from other members of the subgenus. Wings with white costal spot B₂ smaller than black spot basal to it. Palpus with subterminal segment black at both ends with scattered white scales between. Terminal hind tarsal segment entirely white. Whitish scales on mesonotum. MALE TERMINALIA: phallosome (PH) with a pair of broad, dark, serrate leaflets; claspette (CL) with ventral lobes (V-L) fused, simple, without lobules or prominent bristles; basistyle (Bs) with a single, short parabasal spine (PB-s) and two accessory spines (AC-s).

Habits. Readily enters dwellings and bites man. In Venezuela found mainly in the interior and is the most domestic species there.



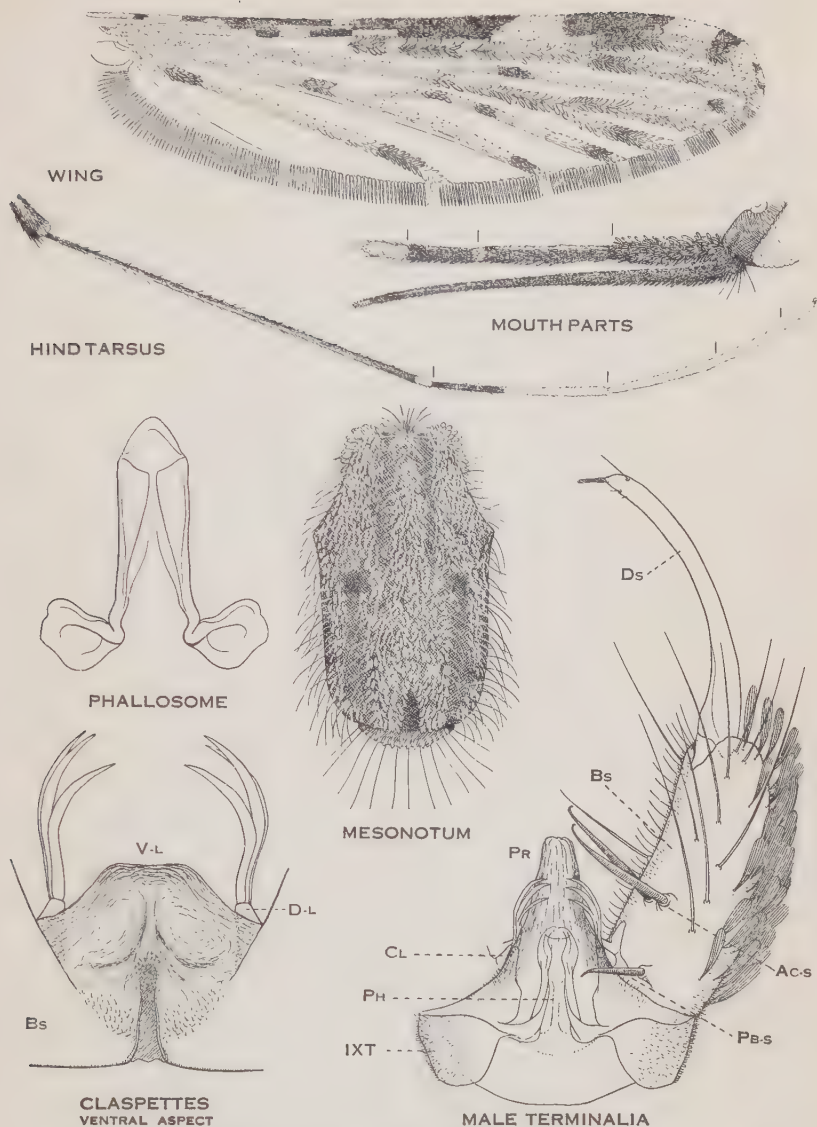
ANOPHELES (NYSSORHYNCHUS) DARLINGI Root, 1926

Identification. HEAD: clypeal hairs 2 and 3 simple, with their bases about equally spaced one from another. THORAX: prothoracic hair 1 with about 10 to 15 branches, and not arising from a common base with hair 2. ABDOMEN: palmate hairs (1) well developed on segments I to VII, their leaflets slender, non-serrate; lateral hair 6 of segment IV to VI unbranched. Posterior spiracular plates with a very large unbranched hair, much longer than anal segment (not illustrated).

Habitat. Found in fresh water or water of low salt content and prefers partial shade. Usually among floating vegetation or debris in ditches, pools, lakes or lagoons, especially the larger bodies of water.

Distribution. Reported from Honduras, British Honduras, northern South America, Brazil, and Argentina. Type locality: Porto das Caixas, State of Rio de Janeiro, Brazil. Above data from male lectotype at the U. S. Nat. Mus., here selected by Dr. Alan Stone.

Illustrated specimens (adult female) from Porto das Caixas, State of Rio de Janeiro, Brazil, paratype; (male terminalia) from L. B. I. Canal, British Guiana; (larva) from Riacho Doce, Maceio, Alagoas, Brazil.

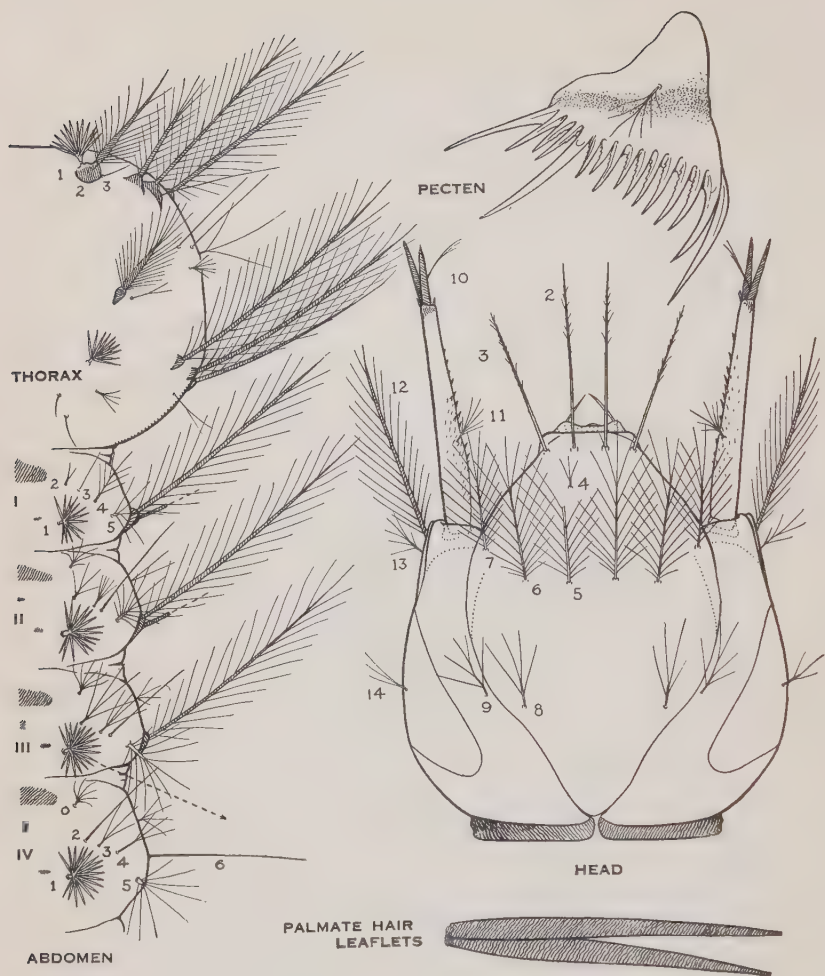


ANOPHELES (NYSSORHYNCHUS) ALBITARSIS Lynch-Arrib., 1878

Considered an important vector of malaria in Brazil and possibly northeastern Argentina.

Identification. ADULT FEMALE: first sternite of abdomen (in dried specimens appears to be ventro-posterior portion of thorax) with two longitudinal lines of white scales. Second abdominal tergite with no posterolateral tufts of black scales. Terminal hind tarsal segment entirely white. Mesonotum with many whitish scales. MALE TERMINALIA: phallosome (PH) without leaflets; claspettes with the fused ventral lobes (V-L) simple, a pair of pouch-like projections on ventral side, no median indentation at apex or prominent bristles; basistyles (Bs) with a single, short parastyle (PB-s) and two accessory spines (Ac-s).

Habits. In South America readily enters dwellings and feeds on man, but in Panama said not to do so.



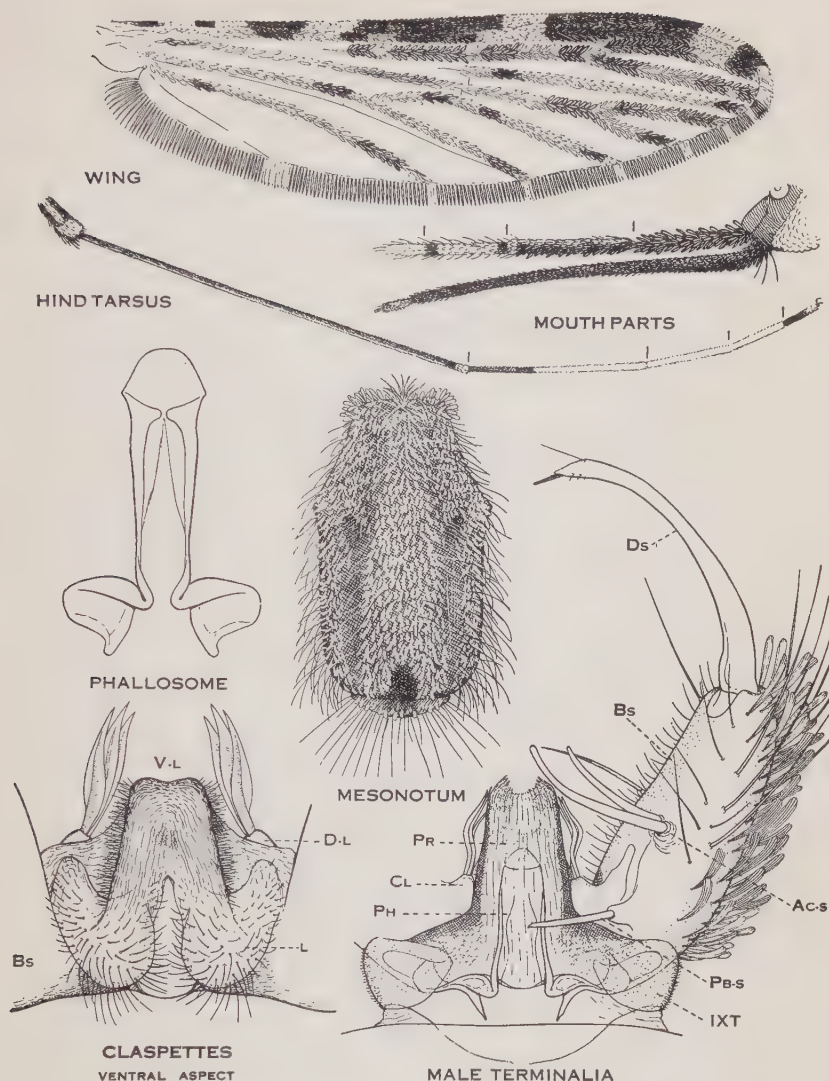
ANOPHELES (NYSSORHYNCHUS) ALBITARSIS Lynch-Arrib., 1878

Identification. HEAD: clypeal hairs 2 and 3 simple, with their bases about equally spaced one from another. THORAX: prothoracic hair 1 palmate, arising from a common base with hair 2, and with leaflets relatively broad. ABDOMEN: palmate hairs (1) well-developed on segments I to VII, their leaflets slender, non-serrate; lateral hair 6 of segments IV to VI unbranched.

Habitat. Usually found in the larger bodies of sunlit fresh water among mats of vegetation or debris.

Distribution. Guatemala, Costa Rica, Panama, Trinidad, northern South America to Bolivia and northern Argentina. Type locality: el Baradero, Prov. of Buenos Aires, Argentina.

Illustrated specimens (adults) from Rio de Janeiro, Brazil; (larva) from Bahia, Brazil.

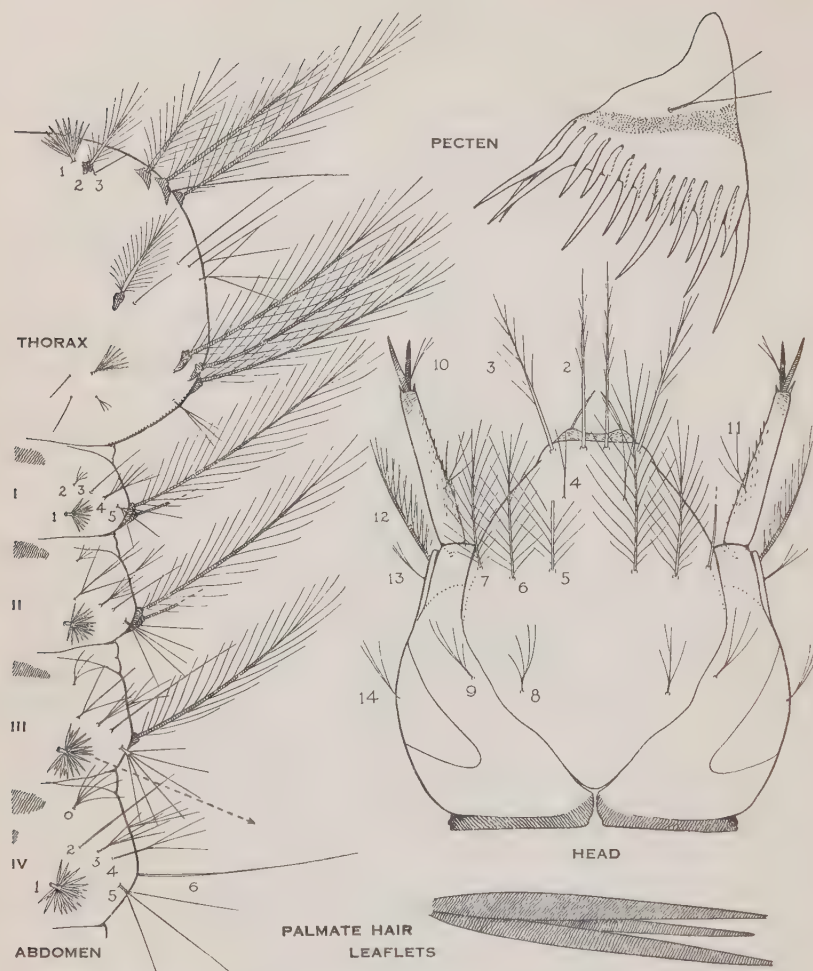


ANOPHELES (NYSSORHYNCHUS) AQUASALIS Curry, 1932

Suspected to be an important vector of malaria in many localities. This species and its close relatives have, until recently, been erroneously called *A. tarsimaculatus*.

Identification. ADULT FEMALE: Distinguished with difficulty from other members of the subgenus. Subterminal segment of palpus white, with narrow black rings at both ends. Second hind tarsal segment usually less than 50% and more than 20% black at base; terminal segment with basal black ring. MALE TERMINALIA: phallosome (PH) without leaflets; dorsal lobes (D-L) of claspettes with their leaf-like "spines" possessing a median, sclerotized rib; the ventral lobes (V-L) fused together and bearing at their base on ventral side, a pair of "lobules" (L) covered with bristles; basistyle (Bs) with a single, short parabasal spine (PB-s) and two accessory spines (Ac-s).

Habits. May at times migrate 2 to 3 miles. Apparently differs in its preference for man according to locality.



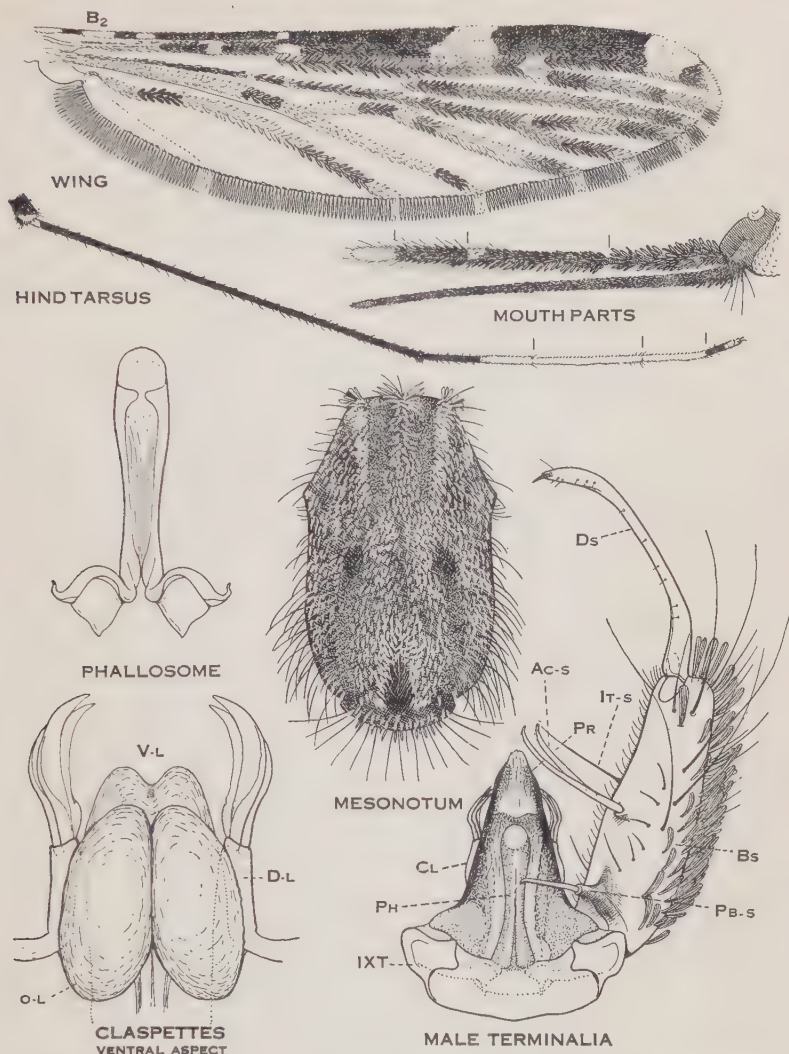
ANOPHELES (NYSSORHYNCHUS) AQUASALIS Curry, 1932

Identification. HEAD: clypeal hairs 2 and 3 with their bases about equally spaced one from another; outer clypeals (3) distinctly feathered. THORAX: prothoracic hair 1 palmate, with narrow leaflets, not arising from a common base with hair 2. ABDOMEN: palmate hair (1) on segment I unpigmented and much smaller than that of segment III; lateral hair 6 of segments IV to VI unbranched. No satisfactory characters have been found to separate the larvae of this species from those of *A. oswaldoi*. The latter, however, are not found in brackish water.

Habitat. Found in swamps, pools, and ditches of brackish water (rarely fresh) along the seacoast.

Distribution. Nicaragua, Panama, Lesser Antilles, Trinidad, northern South America, and Brazil. Type locality: Atlantic side of Isthmus, Canal Zone, Panama.

Illustrated specimens (adults) from Canal Zone, Panama; (larva) reared from eggs, Canal Zone, Panama.



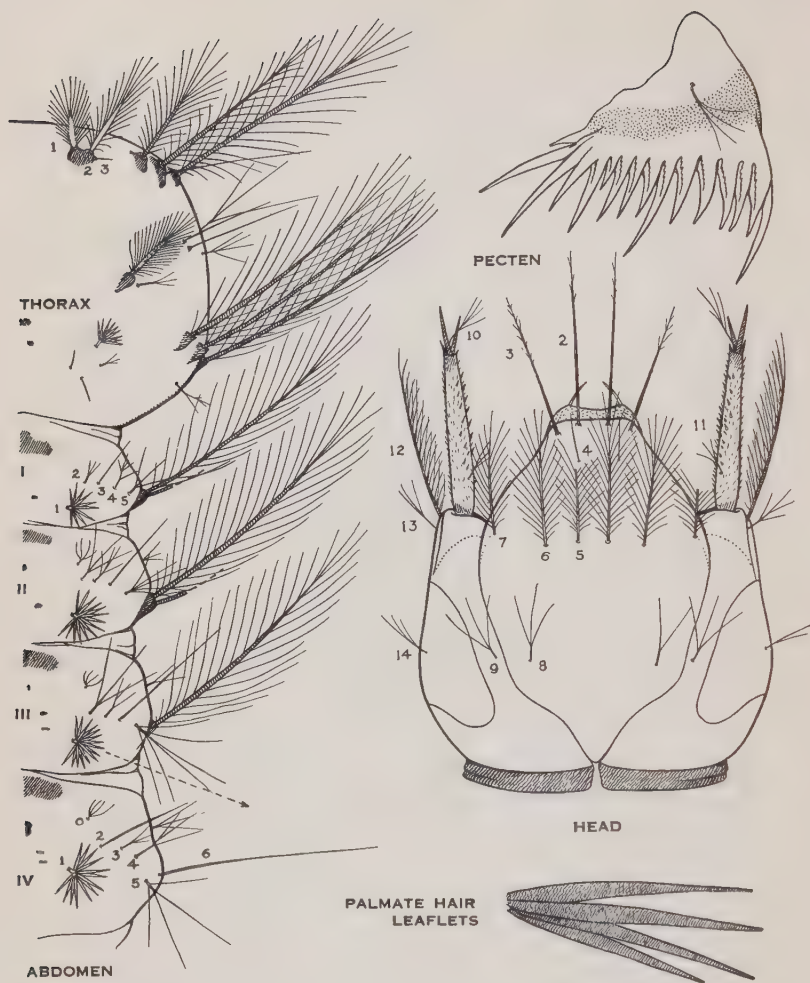
ANOPHELES (NYSSORHYNCHUS) ALBIMANUS Wiedemann, 1821

The most important vector of malaria in the Caribbean region.

Identification. ADULT FEMALE: Costal wing spot B_2 usually longer than preceding black area. Palpus with terminal segment white, subterminal one black. Terminal segment of hind tarsus black at base. White scales on mesonotum. **VARIATIONS:** Hoffmann (1938) described from Mexico two variations of the hind tarsus, one with a black basal ring on 3rd segment and the 2nd segment 75% black, and the other (rarer) with a basal ring also on the 4th segment and the 2nd segment 80% black. **MALE TERMINALIA:** claspettes (CL) with ventral lobes (V-L) spineless, fused together, and with a pair of ovoid lobes (O-L) on their ventral side; phallosome (PH) without leaflets; a single, short parabasal spine (PB-s).

Distribution. Common in lowlands of Caribbean region. Limiting range: Sinaloa, Mexico to Guayaquil, Ecuador; Gulf Coast from lower Rio Grande Valley, Texas south and east to Surinam. West Indies except Martinique, St. Lucia, Grenada, and Trinidad. Type locality: Ins. St. Domingo [Hispaniola].

Habits. Invades dwellings after dark, but usually returns to jungles or breeding grounds before daylight.



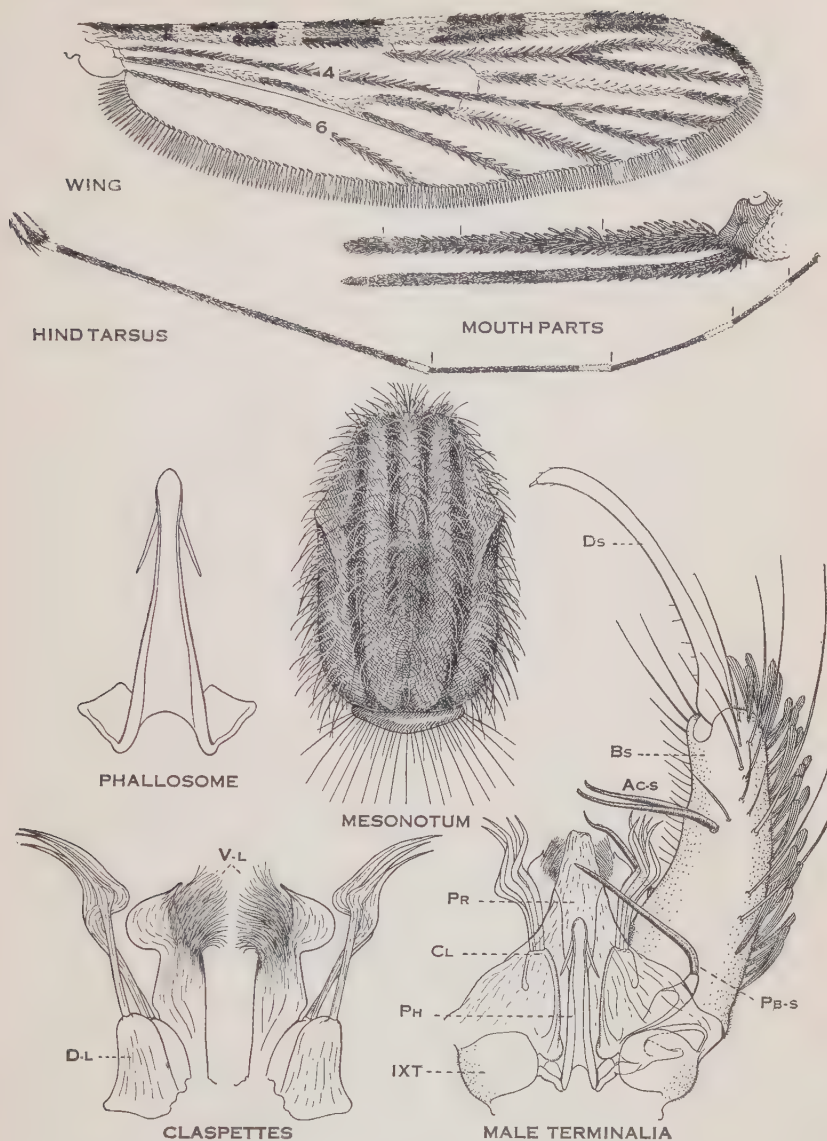
ANOPHELES (NYSSORHYNCHUS) ALBIMANUS Wiedemann, 1821

Identification. HEAD: clypeal hairs 2 and 3 simple, very finely feathered with their bases about equally spaced one from another. THORAX: prothoracic hair 1 finely and plumosely branched with thick stem, arising from a common base with hair 2. ABDOMEN: palmate hairs (1) well developed on segments I to VII, leaflets slender, with smooth margins; lateral hair 6 simple, unbranched on segments IV to VI.

Habitat. Found in fresh to brackish water of pools, ponds, or lakes of a permanent or semi-permanent nature. Needs ample sunlight, and for protection in larger bodies of water an abundance of aquatic vegetation or floating debris.

SYNONYMS. *A. cubensis* Agramonte, 1900; *A. argyritarsis*, subsp. *albipes* Theobald, 1901; *Cellia argyritarsis tarsimaculata* Goeldi, 1905, (new name for *albipes*); *A. albimanus bisignatus* Hoffmann, 1938; *A. albimanus trisignatus* Hoffmann, 1938.

Illustrated specimens (adults and larva) from Brownsville, Texas.

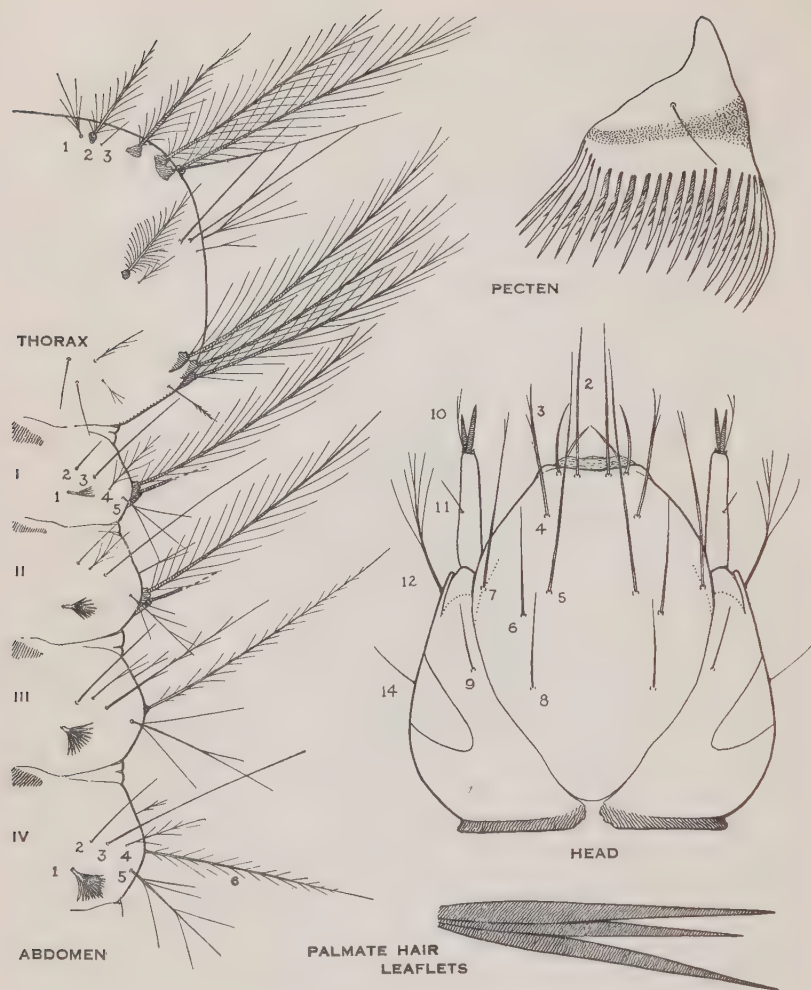


ANOPHELES (KERTESZIA) BELLATOR Dyar and Knab, 1906

A dangerous vector of malaria in the cocoa growing districts of Trinidad.

Identification. ADULT FEMALE: Hind tarsus with terminal segment entirely dark. Anterior margin of wing with 4 or 5 alternating black and white spots; veins 4 and 6 entirely dark. Abdomen without scales. Mesonotum with four longitudinal, dark lines. MALE TERMINALIA: claspettes (CL) with terminal portion of ventral lobes (V-L) very distinctive; phallosome (PH) with a pair of slender, non-serrate leaflets; basistyle (Bs) with one, very long parabasal spine (Pb-s) arising from a distinct tubercle; two accessory spines (Ac-s) on distal half of basistyle.

Habits. In Trinidad, at least, prefers man to animals. Feeds and migrates chiefly at dusk and to a lesser extent at dawn. Will enter houses, but does not remain there during the day.

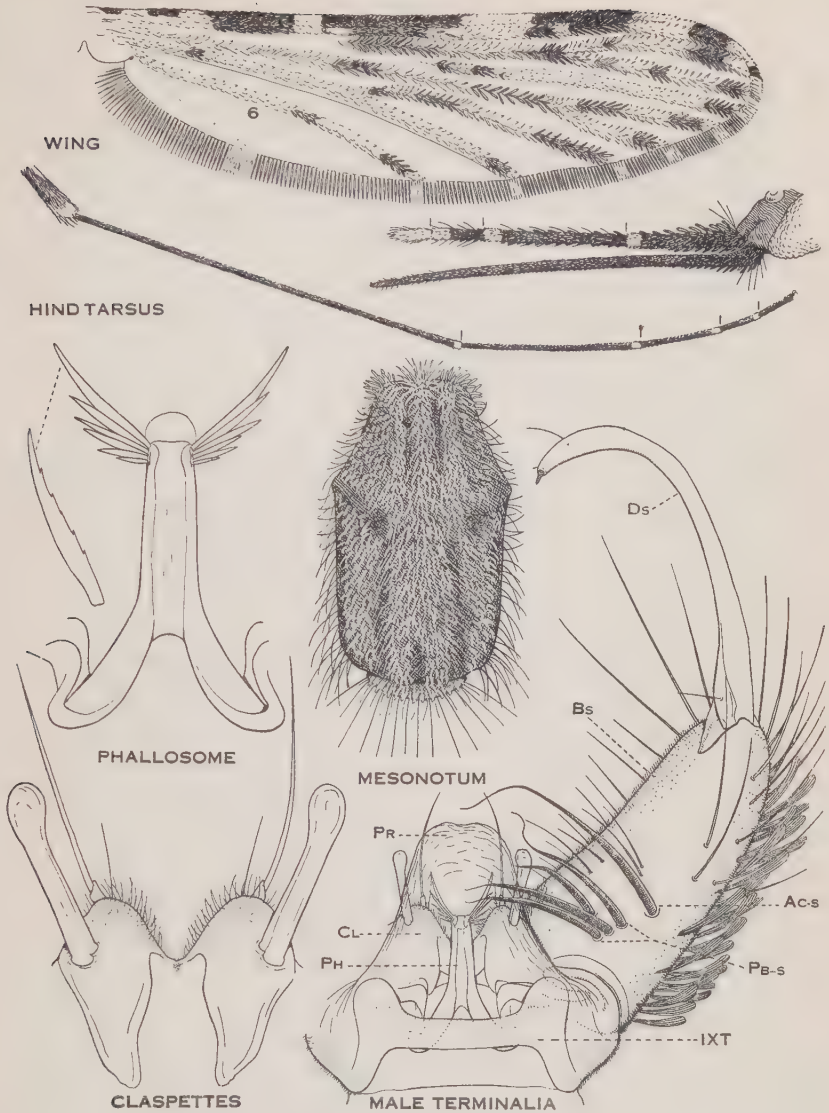


ANOPHELES (KERTESZIA) BELLATOR Dyar and Knab, 1906

Identification. HEAD: most hairs not branched or feathered; frontal hair 5 long, unfeathered (at times weakly branched at tip). ABDOMEN: palmate hairs (1) present on all segments but weakly developed, especially on first segment; their leaflets slender, pointed, non-serrate; postspiracular hair branched (not illustrated).

Habitat. Occurs in the water held by bromeliads, chiefly of the genus *Gravisia*. These plants are epiphytic on trunks and branches of trees in heavy rain forests, and especially favor the immortal tree used for the shade of cocoa. Many other mosquito larvae, especially of the tribe Sabethini, occur in bromeliads, but may, of course, be distinguished by their long culicine air tube.

Distribution. Trinidad (type locality), Venezuela, British Guiana, and Brazil. Illustrated specimens (adults and larva) from Trinidad, B. W. I.

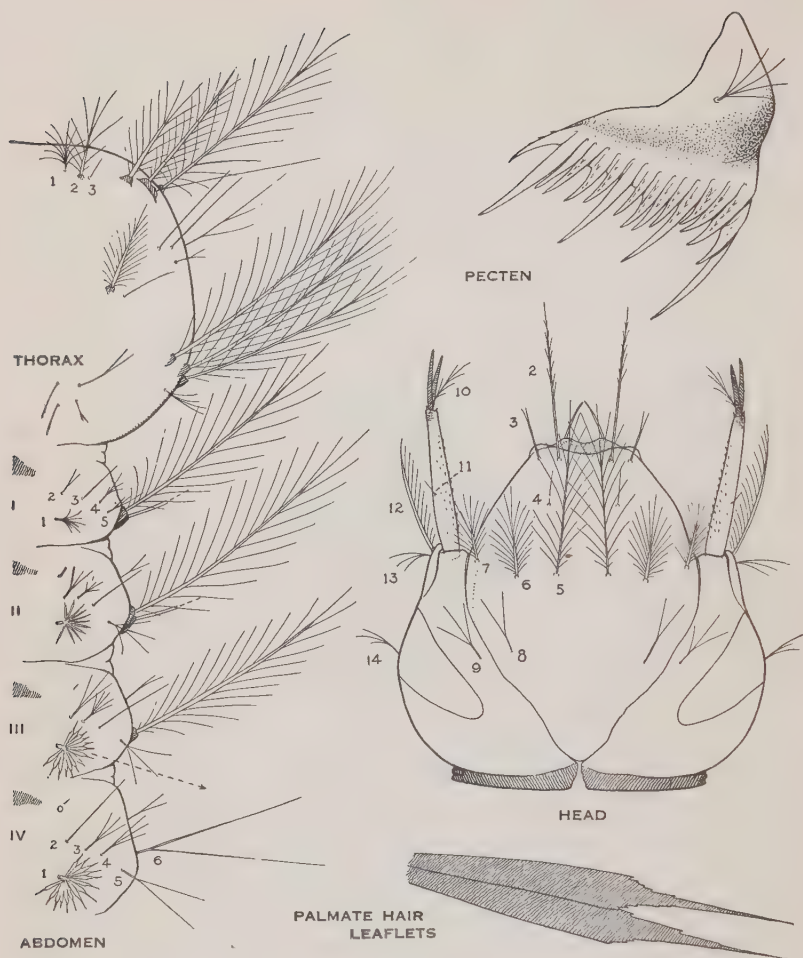


ANOPHELES (MYZOMYIA) GAMBIAE Giles, 1902

With *A. funestus*, the most important vector of malaria in the Ethiopian Region. Also considered an important vector of filariasis (*Wuchereria bancrofti*).

Identification. ADULT FEMALE: Femora and tibiae with yellowish speckles or spots (at times faintly so); hind tarsus dark except for narrow, whitish, apical rings on all but terminal segment. Palpus with 3 white bands, the apical one broad. Wing pattern variable; 6th vein usually with 3 black spots. Mesonotum brown with yellowish brown scales. MALE TERMINALIA: claspettes (CL) with apical spine or bristle less than twice length of club; basistyle (Bs) with 4 parabasal (Pb-s) and 1 accessory spine (Ac-s) grouped together on basal portion; phallosome (PH) with terminal leaflets serrate (visible only in lateral aspect).

Habits. Feeds chiefly on man. Nocturnal, maximum time of biting in early morning hours. Readily enters houses and will rest in the darker portions during the day.



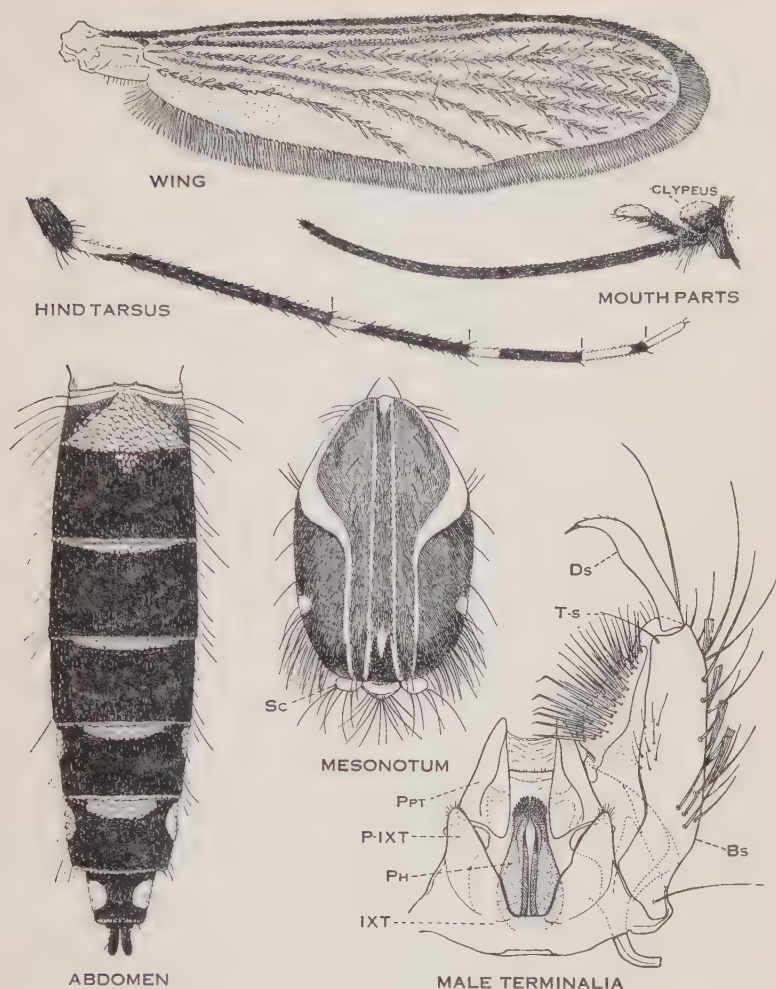
ANOPHELES (MYZOMYIA) GAMBIAE Giles, 1902

Identification. HEAD: inner clypeal hairs (2) weakly to quite distinctly feathered; outer clypeal hairs (3) about a third the length of inner clypeals. THORAX: no palmate-shaped hairs; prothoracic hair 1 with less than 15 branches, usually 5 to 8, and without sclerotized base; mesopleural hairs 9 and 10 both simple, unbranched (not illustrated). ABDOMEN: palmate hairs (1) deeply notched, abruptly narrowed before the tip; teeth of pecten not prominently serrate or spiculate.

Habitat. Prefers sunlit shallow pools including shallow ponds, borrow pits, footprints, roadside drains or ditches, irrigation furrows, drying-up stream-beds, and pools near edges of lakes and swamps.

Distribution. Tropical Africa except in desert regions and high mountains. Also Madagascar, Mauritius, Reunion, Aden, and sporadically in some Mediterranean countries. Introduced in upper Northeast Brazil in 1930, eradicated in 1940. Type locality: Gambia.

Illustrated specimens (adults) from Koumpentown, Senegal, West Africa; (larva) from Akkra, Gold Coast, West Africa. The text is largely from A. M. Evans' Mosquitoes of the Ethiopian Region, 1938.

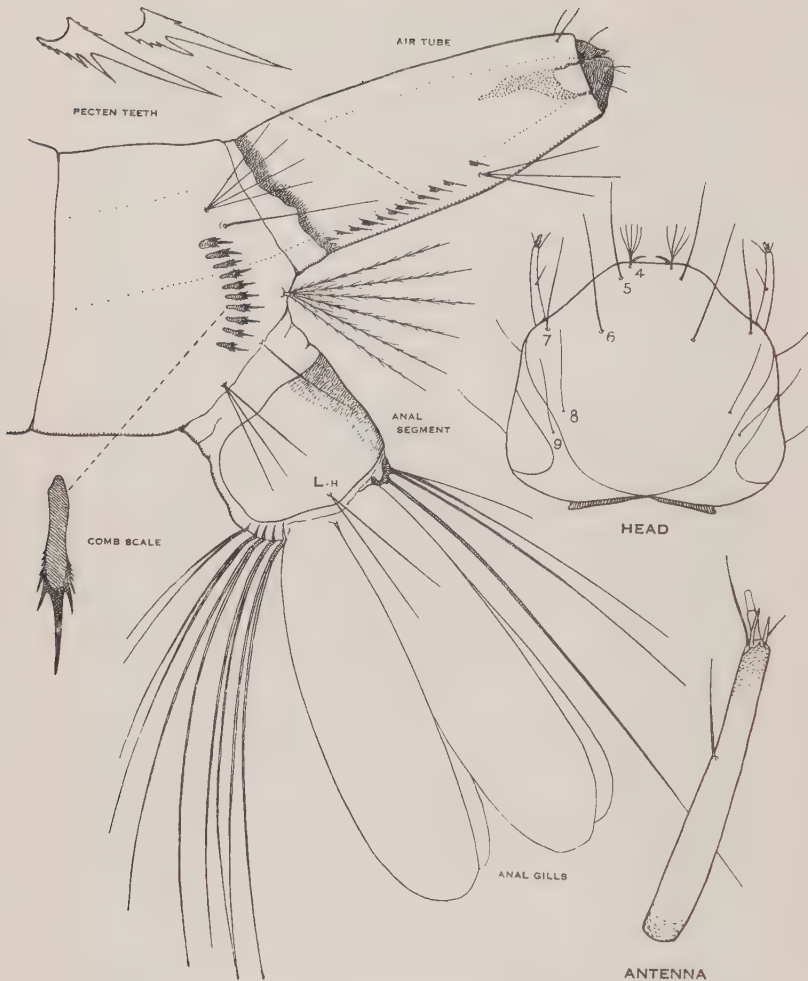


AÈDES (STEGOMYIA) AEGYPTI (Linnaeus), 1762

The most important vector of yellow fever and only demonstrated vector of dengue.

Identification. ADULT FEMALE: Rather small, black (rarely dark brown) with brilliant white markings. Pattern of mesonotum characteristic. Middle femora with white stripe on front side from base nearly to tip. Hind tarsi with basal ring of 3rd segment narrow, sometimes absent. Pattern of abdomen variable. MALE TERMINALIA: claspettes absent; phallosome (PH) with short, fine teeth at apex; lobe-like processes of 9th tergite (P-IXT) large, triangulate; basistyle (Bs) with terminal spine (T-s) small, slender.

Habits. Most active in daylight, especially early morning and late evening. Usual flight range not more than a hundred feet. Found almost exclusively in or about human dwellings and preferably feeds on man. 40° F. usually lethal to adults.



***AÈDES (STEGOMYIA) AEGYPTI* (Linnaeus), 1762**

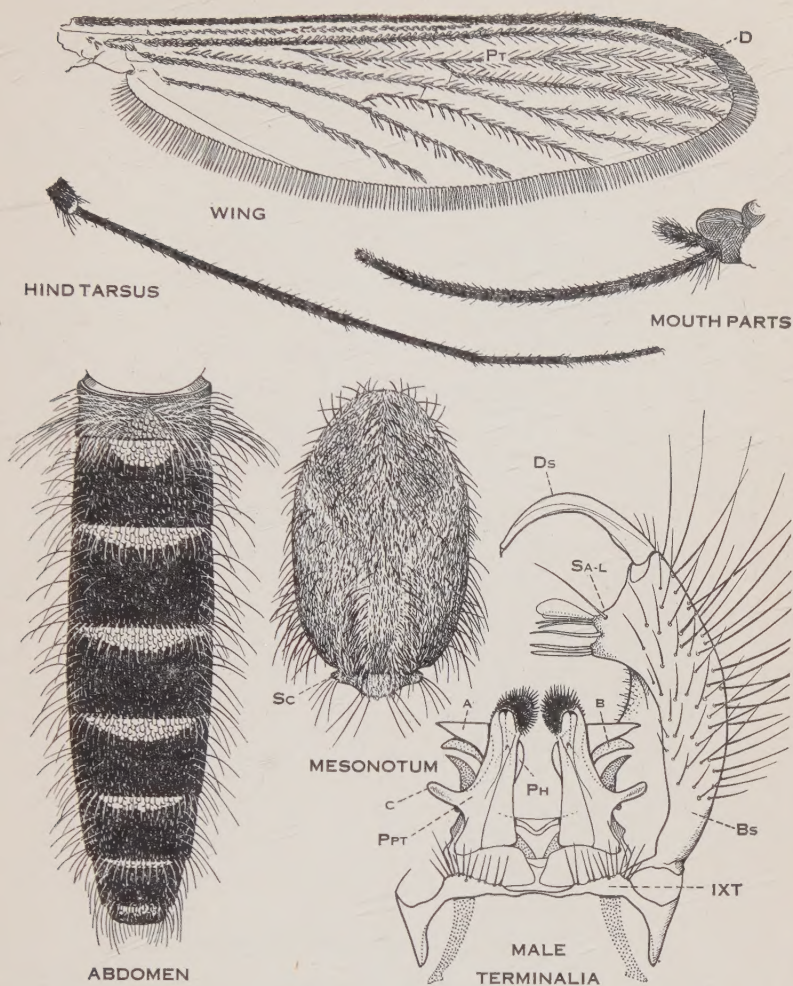
Identification. HEAD: frontal and preantennal hairs (5, 6, 7) single. ABDOMEN: comb scales with a sharp median tooth and pronounced denticles at base; hair tuft of air tube with 3 or more branches; number of pecten teeth variable, the teeth with denticles at base on ventral side, sometimes also on dorsal side; anal segment incompletely ringed by saddle (sclerotized plate) with lateral hair (L-H) double or single.

Habitat. Breeds most frequently in artificial containers in or about human dwellings.

Development. Larval stage usually 9 to 10 days; pupal stage about 36 hours; from egg to adult 11 to 18 days.

Distribution. The warm temperate, subtropical and tropical regions of the world. Often carried to the more northern temperate regions where it may breed until frost. Type locality: Egypt.

Illustrated specimens (adults and larva) from San Antonio, Texas.



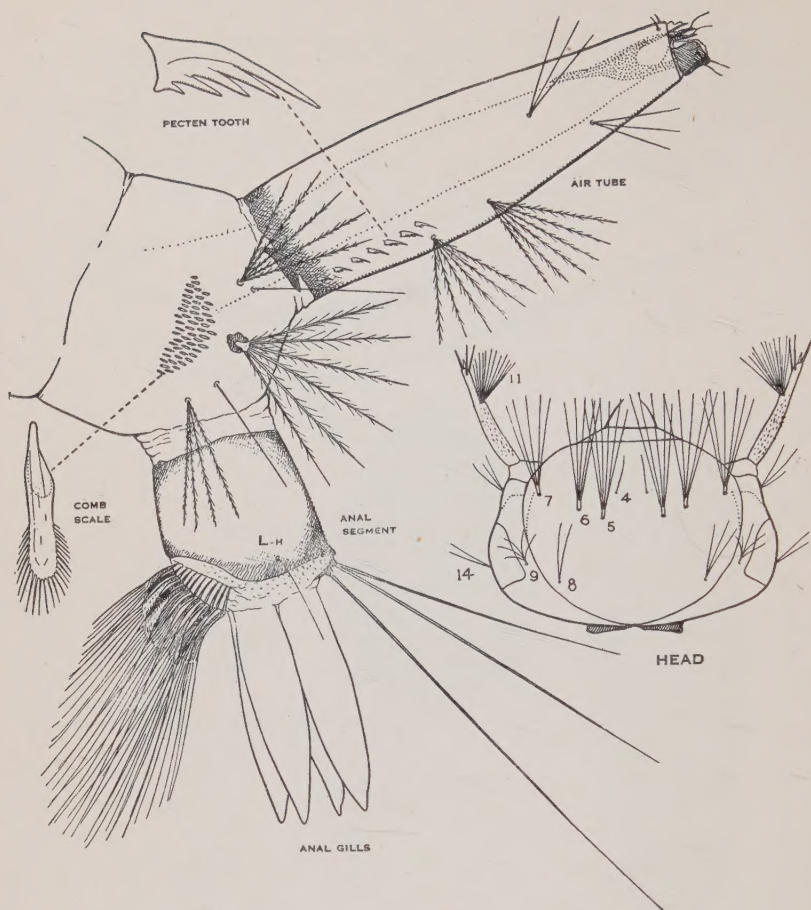
CULEX (CULEX) QUINQUEFASCIATUS Say, 1823

One of the most important household pest mosquitoes of warmer climates and the chief vector of Bancroft's Filaria (*Wuchereria bancrofti*).

Identification. ADULT FEMALE: Medium to small sized; without characteristic markings except some of the white bands of abdomen have convex caudal margins. Tarsi entirely black and mesonotum without markings. Distinguished from *C. pipiens*, a close relative in the north, by the shorter 2nd marginal cell (D) of wing, about $2\frac{1}{2}$ times, or less, the length of the petiole (Pt); also bands of abdomen more definitely rounded. MALE TERMINALIA: basistyle (Bs) with eight appendages on subapical lobe (SA-L). Best distinguished from *C. pipiens* by shape of processes (A and B) of phallosome (PH), and lateral arms (C) of paraproct. Difficult to recognize males on features other than the terminalia.

Habits. A severe nocturnal biter, usually encountered in or about human dwellings.

SYNONYM: *C. fatigans* (Wiedemann).



CULEX (CULEX) QUINQUEFASCIATUS Say, 1823

Identification. HEAD: frontal hairs 5 and 6 with four or more branches; head capsule pale brown or yellowish. ABDOMEN: hair tufts of air tube with subterminal one out of line; pecten teeth with several denticles; comb with about 50 scales. Differs from *C. pipiens*, by the relatively shorter and more definitely swollen air tube and number of pecten teeth, seldom more than 9.

Habitat. Found most frequently in artificial containers, water barrels, catch basins, etc. Also in ground pools. Shows preference for polluted water.

Development. Howard, Dyar and Knab (1915): "Under the most favorable conditions the larvae may reach maturity within 5 or 6 days and the pupal period may be as short as 2 days or less".

Distribution. Widespread in the warm temperate, tropical and subtropical regions of the world. In North America to 39° N. latitude. Type locality: Mississippi River, U. S. A.

Illustrated specimens (adults and larva) from San Antonio, Texas.

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